

$\psi(2S)$

$I^G(J^{PC}) = 0^-(1^{--})$

See the Review on “ $\psi(2S)$ and χ_c branching ratios” before the $\chi_{c0}(1P)$ Listings.

$\psi(2S)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
3686.09 ±0.04 OUR FIT		Error includes scale factor of 1.6.		

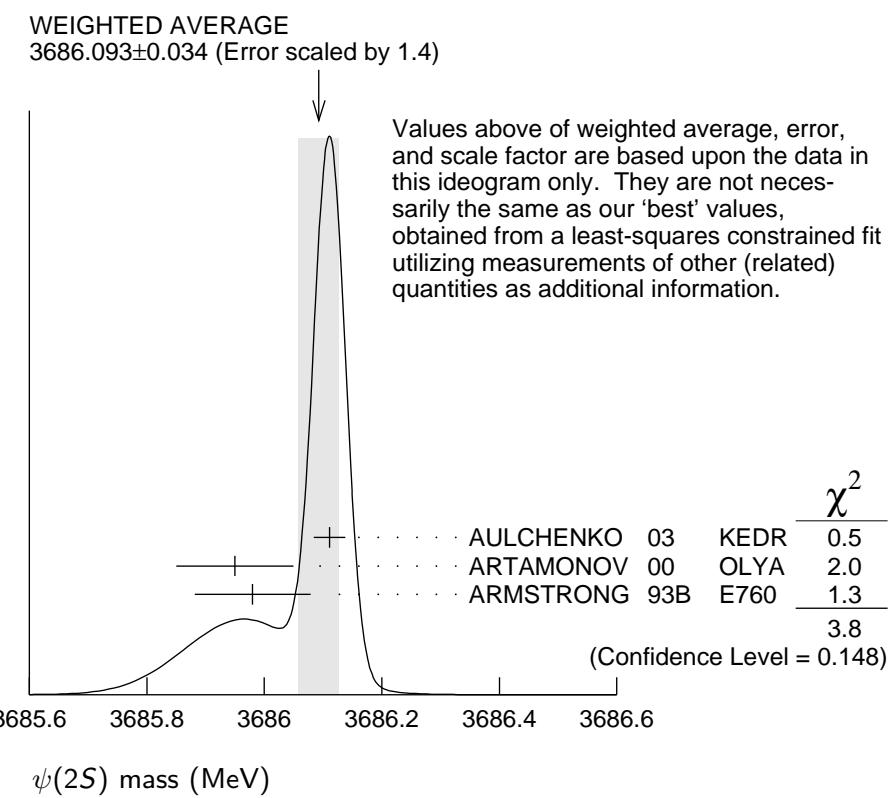
3686.093±0.034 OUR AVERAGE Error includes scale factor of 1.4. See the ideogram below.

3686.111±0.025±0.009		AULCHENKO 03	KEDR	$e^+e^- \rightarrow$ hadrons
3685.95 ±0.10	413	1 ARTAMONOV 00	OLYA	$e^+e^- \rightarrow$ hadrons
3685.98 ±0.09 ±0.04		2 ARMSTRONG 93B	E760	$\bar{p}p \rightarrow e^+e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
3686.00 ±0.10	413	3 ZHOLENTZ 80	OLYA	e^+e^-

¹ Reanalysis of ZHOLENTZ 80 using new electron mass (COHEN 87) and radiative corrections (KURAEV 85).

² Mass central value and systematic error recalculated by us according to Eq.(16) in ARMSTRONG 93B, using the value for the $J/\psi(1S)$ mass from AULCHENKO 03.

³ Superseded by ARTAMONOV 00.



$m_{\psi(2S)} - m_{J/\psi(1S)}$

VALUE (MeV)	DOCUMENT ID	TECN	COMMENT
589.188±0.028 OUR AVERAGE			
589.194±0.027±0.011	⁴ AULCHENKO 03	KEDR	$e^+ e^- \rightarrow$ hadrons
589.7 ± 1.2	LEMOIGNE 82	GOLI	$185 \pi^- Be \rightarrow \gamma \mu^+ \mu^- A$
589.07 ± 0.13	⁴ ZHOLENTZ 80	OLYA	$e^+ e^-$
588.7 ± 0.8	LUTH 75	MRK1	
• • • We do not use the following data for averages, fits, limits, etc. • • •			
588 ± 1	⁵ BAI 98E	BES	$e^+ e^-$
⁴ Redundant with data in mass above.			
⁵ Systematic errors not evaluated.			

$\psi(2S)$ WIDTH

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
327±11 OUR FIT			
284±21 OUR AVERAGE			
331±58± 2	ABLIKIM 06L	BES2	$e^+ e^- \rightarrow$ hadrons
264±27	⁶ BAI 02B	BES2	$e^+ e^-$
306±36±16	ARMSTRONG 93B	E760	$\bar{p}p \rightarrow e^+ e^-$
⁶ From a simultaneous fit to the hadronic and $\mu^+ \mu^-$ cross section, assuming $\Gamma = \Gamma_h + \Gamma_e + \Gamma_\mu + \Gamma_\tau$ and lepton universality. Does not include vacuum polarization correction.			

$\psi(2S)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)	Scale factor/ Confidence level
Γ_1 hadrons	(97.85±0.13) %	
Γ_2 virtual $\gamma \rightarrow$ hadrons	(1.73±0.14) %	S=1.5
Γ_3 light hadrons		
Γ_4 $e^+ e^-$	(7.43±0.18) $\times 10^{-3}$	
Γ_5 $\mu^+ \mu^-$	(7.4 ± 0.8) $\times 10^{-3}$	
Γ_6 $\tau^+ \tau^-$	(3.0 ± 0.4) $\times 10^{-3}$	

Decays into $J/\psi(1S)$ and anything

Γ_7	$J/\psi(1S)$ anything	(56.9 ± 0.9) %	
Γ_8	$J/\psi(1S)$ neutrals	(23.3 ± 0.4) %	
Γ_9	$J/\psi(1S)$ $\pi^+ \pi^-$	(32.3 ± 0.5) %	
Γ_{10}	$J/\psi(1S)$ $\pi^0 \pi^0$	(16.68±0.34) %	
Γ_{11}	$J/\psi(1S)$ η	(3.13±0.08) %	
Γ_{12}	$J/\psi(1S)$ π^0	(1.26±0.13) $\times 10^{-3}$	S=1.3

Hadronic decays

Γ_{13}	$3(\pi^+\pi^-)\pi^0$	$(3.5 \pm 1.6) \times 10^{-3}$	
Γ_{14}	$2(\pi^+\pi^-)\pi^0$	$(2.66 \pm 0.29) \times 10^{-3}$	
Γ_{15}	$\rho a_2(1320)$	$(2.6 \pm 0.9) \times 10^{-4}$	
Γ_{16}	$p\bar{p}$	$(2.85 \pm 0.23) \times 10^{-4}$	S=1.6
Γ_{17}	$\Delta^{++}\bar{\Delta}^{--}$	$(1.28 \pm 0.35) \times 10^{-4}$	
Γ_{18}	$\Lambda\bar{\Lambda}$	$(2.8 \pm 0.5) \times 10^{-4}$	S=2.6
Γ_{19}	$\Sigma^+\bar{\Sigma}^-$	$(2.6 \pm 0.8) \times 10^{-4}$	
Γ_{20}	$\Sigma^0\bar{\Sigma}^0$	$(2.2 \pm 0.4) \times 10^{-4}$	S=1.5
Γ_{21}	$\Sigma(1385)^+\bar{\Sigma}(1385)^-$	$(1.1 \pm 0.4) \times 10^{-4}$	
Γ_{22}	$\Xi^-\bar{\Xi}^+$	$(1.8 \pm 0.6) \times 10^{-4}$	S=2.8
Γ_{23}	$\Xi^0\bar{\Xi}^0$	$(2.8 \pm 0.9) \times 10^{-4}$	
Γ_{24}	$\Xi(1530)^0\bar{\Xi}(1530)^0$	$< 8.1 \times 10^{-5}$	CL=90%
Γ_{25}	$\Omega^-\bar{\Omega}^+$	$< 7.3 \times 10^{-5}$	CL=90%
Γ_{26}	$\pi^0 p\bar{p}$	$(1.33 \pm 0.17) \times 10^{-4}$	
Γ_{27}	$\eta p\bar{p}$	$(6.0 \pm 1.2) \times 10^{-5}$	
Γ_{28}	$\omega p\bar{p}$	$(6.9 \pm 2.1) \times 10^{-5}$	
Γ_{29}	$\phi p\bar{p}$	$< 2.4 \times 10^{-5}$	CL=90%
Γ_{30}	$\pi^+\pi^- p\bar{p}$	$(6.0 \pm 0.4) \times 10^{-4}$	
Γ_{31}	$p\bar{n}\pi^-$ or c.c.	$(2.48 \pm 0.17) \times 10^{-4}$	
Γ_{32}	$p\bar{n}\pi^-\pi^0$	$(3.2 \pm 0.7) \times 10^{-4}$	
Γ_{33}	$2(\pi^+\pi^-\pi^0)$	$(4.6 \pm 1.5) \times 10^{-3}$	
Γ_{34}	$\eta\pi^+\pi^-$	$< 1.6 \times 10^{-4}$	CL=90%
Γ_{35}	$\eta\pi^+\pi^-\pi^0$	$(9.5 \pm 1.7) \times 10^{-4}$	
Γ_{36}	$\eta'\pi^+\pi^-\pi^0$	$(4.5 \pm 2.1) \times 10^{-4}$	
Γ_{37}	$\omega\pi^+\pi^-$	$(6.6 \pm 1.7) \times 10^{-4}$	S=2.7
Γ_{38}	$b_1^\pm\pi^\mp$	$(3.6 \pm 0.6) \times 10^{-4}$	
Γ_{39}	$b_1^0\pi^0$	$(2.4 \pm 0.6) \times 10^{-4}$	
Γ_{40}	$\omega f_2(1270)$	$(2.0 \pm 0.6) \times 10^{-4}$	
Γ_{41}	$\pi^+\pi^- K^+K^-$	$(7.2 \pm 0.5) \times 10^{-4}$	
Γ_{42}	$\rho^0 K^+K^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{43}	$K^*(892)^0\bar{K}_2^*(1430)^0$	$(1.9 \pm 0.5) \times 10^{-4}$	
Γ_{44}	$K^+K^- 2(\pi^+\pi^-)$	$(1.8 \pm 0.9) \times 10^{-3}$	
Γ_{45}	$K_1(1270)^\pm K^\mp$	$(1.00 \pm 0.28) \times 10^{-3}$	
Γ_{46}	$K_S^0 K_S^0 \pi^+\pi^-$	$(2.2 \pm 0.4) \times 10^{-4}$	
Γ_{47}	$\rho^0 p\bar{p}$	$(5.0 \pm 2.2) \times 10^{-5}$	
Γ_{48}	$K^+\bar{K}^*(892)^0\pi^- + \text{c.c.}$	$(6.7 \pm 2.5) \times 10^{-4}$	
Γ_{49}	$2(\pi^+\pi^-)$	$(2.4 \pm 0.6) \times 10^{-4}$	S=2.2
Γ_{50}	$\rho^0\pi^+\pi^-$	$(2.2 \pm 0.6) \times 10^{-4}$	S=1.4
Γ_{51}	$K^+K^-\pi^+\pi^-\pi^0$	$(1.24 \pm 0.10) \times 10^{-3}$	
Γ_{52}	$\omega f_0(1710) \rightarrow \omega K^+K^-$	$(5.9 \pm 2.2) \times 10^{-5}$	
Γ_{53}	$K^*(892)^0 K^- \pi^+\pi^0 + \text{c.c.}$	$(8.6 \pm 2.2) \times 10^{-4}$	
Γ_{54}	$K^*(892)^+ K^- \pi^+\pi^- + \text{c.c.}$	$(9.6 \pm 2.8) \times 10^{-4}$	
Γ_{55}	$K^*(892)^+ K^- \rho^0 + \text{c.c.}$	$(7.3 \pm 2.6) \times 10^{-4}$	

Γ_{56}	$K^*(892)^0 K^- \rho^+ + \text{c.c.}$	$(6.1 \pm 1.8) \times 10^{-4}$	
Γ_{57}	$\eta K^+ K^-$	$< 1.3 \times 10^{-4}$	CL=90%
Γ_{58}	$\omega K^+ K^-$	$(1.85 \pm 0.25) \times 10^{-4}$	S=1.1
Γ_{59}	$3(\pi^+ \pi^-)$	$(3.5 \pm 2.0) \times 10^{-4}$	S=2.8
Γ_{60}	$p\bar{p} \pi^+ \pi^- \pi^0$	$(7.3 \pm 0.7) \times 10^{-4}$	
Γ_{61}	$K^+ K^-$	$(6.3 \pm 0.7) \times 10^{-5}$	
Γ_{62}	$K_S^0 K_L^0$	$(5.4 \pm 0.5) \times 10^{-5}$	
Γ_{63}	$\pi^+ \pi^- \pi^0$	$(1.68 \pm 0.26) \times 10^{-4}$	S=1.4
Γ_{64}	$\rho(2150)\pi \rightarrow \pi^+ \pi^- \pi^0$	$(1.9^{+1.2}_{-0.4}) \times 10^{-4}$	
Γ_{65}	$\rho(770)\pi \rightarrow \pi^+ \pi^- \pi^0$	$(3.2 \pm 1.2) \times 10^{-5}$	S=1.8
Γ_{66}	$\pi^+ \pi^-$	$(8 \pm 5) \times 10^{-5}$	
Γ_{67}	$K_1(1400)^\pm K^\mp$	$< 3.1 \times 10^{-4}$	CL=90%
Γ_{68}	$K^+ K^- \pi^0$	$< 2.96 \times 10^{-5}$	CL=90%
Γ_{69}	$K^+ \bar{K}^*(892)^- + \text{c.c.}$	$(1.7^{+0.8}_{-0.7}) \times 10^{-5}$	
Γ_{70}	$K^*(892)^0 \bar{K}^0 + \text{c.c.}$	$(1.09 \pm 0.20) \times 10^{-4}$	
Γ_{71}	$\phi \pi^+ \pi^-$	$(1.13 \pm 0.29) \times 10^{-4}$	S=1.7
Γ_{72}	$\phi f_0(980) \rightarrow \pi^+ \pi^-$	$(6.0 \pm 2.2) \times 10^{-5}$	
Γ_{73}	$2(K^+ K^-)$	$(6.0 \pm 1.4) \times 10^{-5}$	
Γ_{74}	$\phi K^+ K^-$	$(7.0 \pm 1.6) \times 10^{-5}$	
Γ_{75}	$2(K^+ K^-) \pi^0$	$(1.10 \pm 0.28) \times 10^{-4}$	
Γ_{76}	$\phi \eta$	$(2.8^{+1.0}_{-0.8}) \times 10^{-5}$	
Γ_{77}	$\phi \eta'$	$(3.1 \pm 1.6) \times 10^{-5}$	
Γ_{78}	$\omega \eta'$	$(3.2^{+2.5}_{-2.1}) \times 10^{-5}$	
Γ_{79}	$\omega \pi^0$	$(2.1 \pm 0.6) \times 10^{-5}$	
Γ_{80}	$\rho \eta'$	$(1.9^{+1.7}_{-1.2}) \times 10^{-5}$	
Γ_{81}	$\rho \eta$	$(2.2 \pm 0.6) \times 10^{-5}$	S=1.1
Γ_{82}	$\omega \eta$	$< 1.1 \times 10^{-5}$	CL=90%
Γ_{83}	$\phi \pi^0$	$< 4 \times 10^{-6}$	CL=90%
Γ_{84}	$\eta_c \pi^+ \pi^- \pi^0$	$< 1.0 \times 10^{-3}$	CL=90%
Γ_{85}	$p\bar{p} K^+ K^-$	$(2.7 \pm 0.7) \times 10^{-5}$	
Γ_{86}	$\Lambda \bar{\Lambda} \pi^+ \pi^-$	$(2.8 \pm 0.6) \times 10^{-4}$	
Γ_{87}	$\Lambda \bar{p} K^+$	$(1.00 \pm 0.14) \times 10^{-4}$	
Γ_{88}	$\Lambda \bar{p} K^+ \pi^+ \pi^-$	$(1.8 \pm 0.4) \times 10^{-4}$	
Γ_{89}	$\phi f'_2(1525)$	$(4.4 \pm 1.6) \times 10^{-5}$	
Γ_{90}	$\Theta(1540) \bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.}$	$< 8.8 \times 10^{-6}$	CL=90%
Γ_{91}	$\Theta(1540) K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n}$	$< 1.0 \times 10^{-5}$	CL=90%
Γ_{92}	$\Theta(1540) K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n$	$< 7.0 \times 10^{-6}$	CL=90%
Γ_{93}	$\bar{\Theta}(1540) K^+ n \rightarrow K_S^0 \bar{p} K^+ n$	$< 2.6 \times 10^{-5}$	CL=90%
Γ_{94}	$\bar{\Theta}(1540) K_S^0 p \rightarrow K_S^0 p K^- \bar{n}$	$< 6.0 \times 10^{-6}$	CL=90%
Γ_{95}	$K_S^0 K_S^0$	$< 4.6 \times 10^{-6}$	

Radiative decays

Γ_{96}	$\gamma\chi_{c0}(1P)$	(9.3 \pm 0.4) %	
Γ_{97}	$\gamma\chi_{c1}(1P)$	(8.8 \pm 0.4) %	
Γ_{98}	$\gamma\chi_{c2}(1P)$	(8.1 \pm 0.4) %	
Γ_{99}	$\gamma\eta_c(1S)$	(3.0 \pm 0.5) \times 10 ⁻³	
Γ_{100}	$\gamma\eta_c(2S)$	< 2.0 \times 10 ⁻³	CL=90%
Γ_{101}	$\gamma\pi^0$	< 5.4 \times 10 ⁻³	CL=95%
Γ_{102}	$\gamma\eta'(958)$	(1.36 \pm 0.24) \times 10 ⁻⁴	
Γ_{103}	$\gamma f_2(1270)$	(2.1 \pm 0.4) \times 10 ⁻⁴	
Γ_{104}	$\gamma f_0(1710)$		
Γ_{105}	$\gamma f_0(1710) \rightarrow \gamma\pi\pi$	(3.0 \pm 1.3) \times 10 ⁻⁵	
Γ_{106}	$\gamma f_0(1710) \rightarrow \gamma K\bar{K}$	(6.0 \pm 1.6) \times 10 ⁻⁵	
Γ_{107}	$\gamma\gamma$	< 1.3 \times 10 ⁻⁴	CL=90%
Γ_{108}	$\gamma\eta$	< 9 \times 10 ⁻⁵	CL=90%
Γ_{109}	$\gamma\eta\pi^+\pi^-$	(8.7 \pm 2.1) \times 10 ⁻⁴	
Γ_{110}	$\gamma\eta(1405)$		
Γ_{111}	$\gamma\eta(1405) \rightarrow \gamma K\bar{K}\pi$	< 9 \times 10 ⁻⁵	CL=90%
Γ_{112}	$\gamma\eta(1405) \rightarrow \eta\pi^+\pi^-$	(3.6 \pm 2.5) \times 10 ⁻⁵	
Γ_{113}	$\gamma\eta(1475)$		
Γ_{114}	$\gamma\eta(1475) \rightarrow K\bar{K}\pi$	< 1.4 \times 10 ⁻⁴	CL=90%
Γ_{115}	$\gamma\eta(1475) \rightarrow \eta\pi^+\pi^-$	< 8.8 \times 10 ⁻⁵	CL=90%

$\psi(2S)$ PARTIAL WIDTHS

$\Gamma(\text{hadrons})$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
258 \pm 26	BAI	02B	BES2 e^+e^-
224 \pm 56	LUTH	75	MRK1 e^+e^-

Γ_1

$\Gamma(e^+e^-)$

VALUE (keV)	DOCUMENT ID	TECN	COMMENT
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2.43 \pm 0.05 OUR FIT

2.29 \pm 0.10 OUR AVERAGE

2.330 \pm 0.036 \pm 0.110	ABLIKIM	06L	BES2 $e^+e^- \rightarrow \text{hadrons}$
2.14 \pm 0.21	ALEXANDER	89	RVUE See τ mini-review
• • • We do not use the following data for averages, fits, limits, etc. • • •			
2.44 \pm 0.21	⁷ BAI	02B	BES2 e^+e^-
2.0 \pm 0.3	BRANDELIK	79C	DASP e^+e^-
2.1 \pm 0.3	⁸ LUTH	75	MRK1 e^+e^-

Γ_4

⁷ From a simultaneous fit to e^+e^- , $\mu^+\mu^-$, and hadronic channel, assuming $\Gamma_e = \Gamma_\mu = \Gamma_\tau/0.38847$.

⁸ From a simultaneous fit to e^+e^- , $\mu^+\mu^-$, and hadronic channels assuming $\Gamma(e^+e^-) = \Gamma(\mu^+\mu^-)$.

$\Gamma(\gamma\gamma)$

<u>VALUE</u> (eV)	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<43	90	BRANDELIK	79C DASP	$e^+ e^-$

 Γ_{107} $\psi(2S) \Gamma(i) \Gamma(e^+ e^-)/\Gamma(\text{total})$

This combination of a partial width with the partial width into $e^+ e^-$ and with the total width is obtained from the integrated cross section into channel i in the $e^+ e^-$ annihilation. We list only data that have not been used to determine the partial width $\Gamma(i)$ or the branching ratio $\Gamma(i)/\text{total}$.

 $\Gamma(\text{hadrons}) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (keV)	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				

 $\Gamma(\tau^+ \tau^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (eV)	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •				

9.0 \pm 2.6 79 ⁹ ANASHIN 07 KEDR $e^+ e^- \rightarrow \psi(2S) \rightarrow \tau^+ \tau^-$

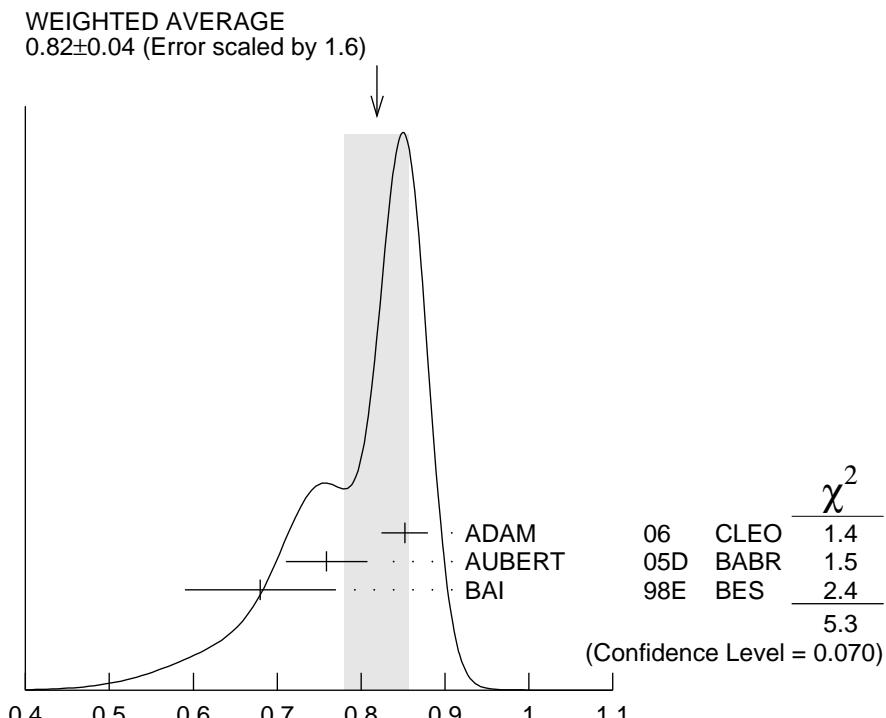
⁹ Using $\psi(2S)$ total width of 337 ± 13 keV. Systematic errors not evaluated.

 $\Gamma(J/\psi(1S)\pi^+\pi^-) \times \Gamma(e^+ e^-)/\Gamma_{\text{total}}$

<u>VALUE</u> (keV)	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.785 \pm 0.017 OUR FIT				
0.82 \pm 0.04 OUR AVERAGE				Error includes scale factor of 1.6. See the ideogram below.
0.852 \pm 0.010 \pm 0.026	19.5k \pm 243	ADAM	06 CLEO	$3.773 e^+ e^- \rightarrow \gamma \psi(2S)$
0.76 \pm 0.05 \pm 0.01	544	¹⁰ AUBERT	05D BABR	$10.6 e^+ e^- \rightarrow \pi^+ \pi^- \mu^+ \mu^- \gamma$
0.68 \pm 0.09		¹¹ BAI	98E BES	$e^+ e^-$

¹⁰ AUBERT 05D reports $[\Gamma(\psi(2S) \rightarrow e^+ e^-) B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-)] \times B(J/\psi \rightarrow \mu^+ \mu^-) = (0.0450 \pm 0.0018 \pm 0.0022)$ keV. We divide by our best value $B(J/\psi \rightarrow \mu^+ \mu^-) = (5.93 \pm 0.06) \times 10^{-2}$. Our first error is the total experiment's error and our second error is the systematic error from using our best value.

¹¹ The value of $\Gamma(e^+ e^-)$ quoted in BAI 98E is derived using $B(\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-) = (32.4 \pm 2.6) \times 10^{-2}$ and $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1203 \pm 0.0038$. Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.



$$\Gamma(J/\psi(1S)\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_9\Gamma_4/\Gamma$$

$$\Gamma(J/\psi(1S)\pi^0\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{10}\Gamma_4/\Gamma$$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.405±0.010 OUR FIT				
0.411±0.008±0.018	$3.6k \pm 96$	ADAM	06	CLEO $3.773 e^+e^- \rightarrow \gamma\psi(2S)$

$$\Gamma(J/\psi(1S)\eta) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{11}\Gamma_4/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
76.1±2.2 OUR FIT				
88 ±6 ±7	291 ± 24	ADAM	06	CLEO $3.773 e^+e^- \rightarrow \gamma\psi(2S)$

$$\Gamma(J/\psi(1S)\pi^0) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{12}\Gamma_4/\Gamma$$

VALUE (eV)	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
<8	90	<37	ADAM	06	CLEO $3.773 e^+e^- \rightarrow \gamma\psi(2S)$

$$\Gamma(p\bar{p}) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{16}\Gamma_4/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.70±0.17±0.03	22	AUBERT	06B	$e^+e^- \rightarrow p\bar{p}\gamma$

$$\Gamma(2(\pi^+\pi^-\pi^0)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{33}\Gamma_4/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
11.2±3.3±1.3	43	AUBERT	06D	BABR $10.6 e^+e^- \rightarrow 2(\pi^+\pi^-\pi^0)\gamma$

$$\Gamma(K^+K^-2(\pi^+\pi^-)) \times \Gamma(e^+e^-)/\Gamma_{\text{total}} \quad \Gamma_{44}\Gamma_4/\Gamma$$

VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
4.4±2.1±0.3	26	AUBERT	06D	BABR $10.6 e^+e^- \rightarrow K^+K^-2(\pi^+\pi^-)\gamma$

$\Gamma(\phi\pi^+\pi^-) \times \Gamma(e^+e^-)/\Gamma_{\text{total}}$	$\Gamma_{71}\Gamma_4/\Gamma$			
VALUE (eV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.57±0.23±0.01	10	12 AUBERT,BE	06D BABR	$10.6 e^+e^- \rightarrow K^+K^-\pi^+\pi^-\gamma$
12 AUBERT,BE 06D reports $[B(\psi(2S) \rightarrow e^+e^- + \psi(2S) \rightarrow \phi\pi^+\pi^-) \times B(\phi(1020) \rightarrow K^+K^-)] = 0.28 \pm 0.11 \pm 0.02$. We divide by our best value $B(\phi(1020) \rightarrow K^+K^-) = (49.3 \pm 0.6) \times 10^{-2}$. Our first error is their experiment's error and our second error is the systematic error from using our best value.				

$\psi(2S)$ BRANCHING RATIOS

$\Gamma(\text{hadrons})/\Gamma_{\text{total}}$	Γ_1/Γ		
VALUE	DOCUMENT ID	TECN	COMMENT
0.9785±0.0013 OUR AVERAGE			
0.9779±0.0015	13 BAI	02B BES2	e^+e^-
0.981 ± 0.003	13 LUTH	75 MRK1	e^+e^-

13 Includes cascade decay into $J/\psi(1S)$.

$\Gamma(\text{virtual } \gamma \rightarrow \text{hadrons})/\Gamma_{\text{total}}$	Γ_2/Γ		
VALUE	DOCUMENT ID	TECN	COMMENT
0.0173±0.0014 OUR AVERAGE Error includes scale factor of 1.5.			
0.0166±0.0010	14,15 SETH	04 RVUE	e^+e^-
0.0199±0.0019	14 BAI	02B BES2	e^+e^-
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.029 ± 0.004	14 LUTH	75 MRK1	e^+e^-
14 Included in $\Gamma(\text{hadrons})/\Gamma_{\text{total}}$.			
15 Using $B(\psi(2S) \rightarrow \ell^+\ell^-) = (0.73 \pm 0.04)\%$ from RPP-2002 and $R = 2.28 \pm 0.04$ determined by a fit to data from BAI 00 and BAI 02C.			

$\Gamma(\text{light hadrons})/\Gamma_{\text{total}}$	Γ_3/Γ		
VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.169±0.026	16 ADAM	05A CLEO	$e^+e^- \rightarrow \psi(2S)$
16 Uses $B(J/\psi X)$ from ADAM 05A, $B(\chi_c J\gamma)$, $B(\eta_c\gamma)$ from ATHAR 04 and $B(\ell^+\ell^-)$ from PDG 04.			

$\Gamma(e^+e^-)/\Gamma_{\text{total}}$	Γ_4/Γ		
VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
74.3±1.8 OUR FIT			
• • • We do not use the following data for averages, fits, limits, etc. • • •			
88 ± 13	17 FELDMAN	77 RVUE	e^+e^-
17 From an overall fit assuming equal partial widths for e^+e^- and $\mu^+\mu^-$. For a measurement of the ratio see the entry $\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$ below. Includes LUTH 75, HILGER 75, BURMEISTER 77.			

$\Gamma(\mu^+\mu^-)/\Gamma_{\text{total}}$	Γ_5/Γ		
VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
74±8 OUR FIT			

$\Gamma(\mu^+\mu^-)/\Gamma(e^+e^-)$

VALUE

1.00 ± 0.11 OUR FIT

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.89 ± 0.16

DOCUMENT ID

BOYARSKI

TECN

75C MRK1

COMMENT

Γ_5/Γ_4

$\Gamma(\tau^+\tau^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})

30 ± 4 OUR FIT

30.8 ± 2.1 ± 3.8

DOCUMENT ID

¹⁸ ABLIKIM

TECN

06W BES

COMMENT

Γ_6/Γ

$e^+ e^- \rightarrow \psi(2S)$

¹⁸ Computed using PDG 02 value of $B(\psi(2S) \rightarrow \text{hadrons}) = 0.9810 \pm 0.0030$ to estimate the total number of $\psi(2S)$ events.

———— DECAYS INTO $J/\psi(1S)$ AND ANYTHING ———

$\Gamma(J/\psi(1S)\text{anything})/\Gamma_{\text{total}}$

VALUE EVTS

0.569 ± 0.009 OUR FIT

0.592 ± 0.018 OUR AVERAGE

$0.5950 \pm 0.0015 \pm 0.0190$ 151k

DOCUMENT ID

ADAM

TECN

05A CLEO

COMMENT

$e^+ e^- \rightarrow \psi(2S)$

0.51 ± 0.12

BRANDELIK

79C DASP

$e^+ e^- \rightarrow \mu^+ \mu^- X$

0.57 ± 0.08

ABRAMS

75B MRK1

$e^+ e^- \rightarrow \mu^+ \mu^- X$

Γ_7/Γ

$\Gamma(e^+e^-)/\Gamma(J/\psi(1S)\text{anything})$

VALUE (units 10^{-2}) EVTS

1.305 ± 0.026 OUR FIT

1.28 ± 0.04 OUR AVERAGE Error includes scale factor of 1.6. See the ideogram below.

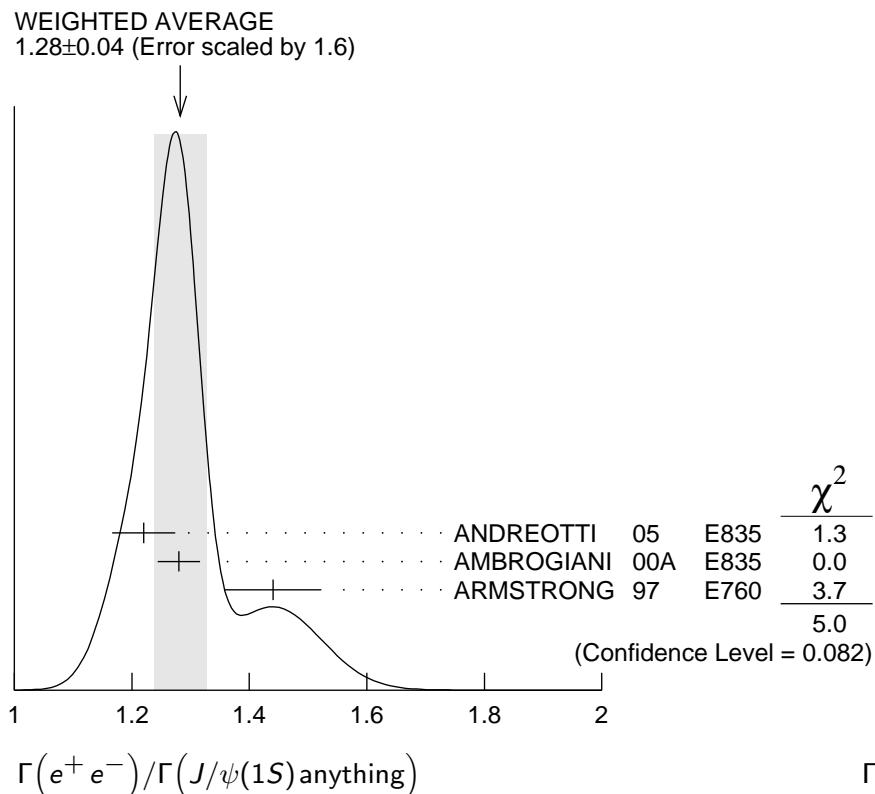
$1.22 \pm 0.02 \pm 0.05$ 5097 ± 73 ¹⁹ ANDREOTTI 05 E835 $p\bar{p} \rightarrow \psi(2S) \rightarrow e^+ e^-$

$1.28 \pm 0.03 \pm 0.02$ ¹⁹ AMBROGIANI 00A E835 $p\bar{p} \rightarrow \psi(2S)$

$1.44 \pm 0.08 \pm 0.02$ ¹⁹ ARMSTRONG 97 E760 $\bar{p}p \rightarrow \psi(2S)$

Γ_4/Γ_7

¹⁹ Using $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0593 \pm 0.0010$.



$\Gamma(\mu^+ \mu^-)/\Gamma(J/\psi(1S)\text{anything})$

VALUE	DOCUMENT ID	TECN	COMMENT
0.0130±0.0014 OUR FIT			
0.014 ±0.003	HILGER	75	SPEC $e^+ e^-$

$\Gamma(J/\psi(1S)\text{ neutrals})/\Gamma_{\text{total}}$

VALUE	DOCUMENT ID
0.233±0.004 OUR FIT	

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma_{\text{total}}$

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.323 ±0.005 OUR FIT				
0.323 ±0.013 OUR AVERAGE				
0.323 ±0.014		BAI	02B	BES2 $e^+ e^-$
0.32 ±0.04		ABRAMS	75B	MRK1 $e^+ e^- \rightarrow J/\psi \pi^+ \pi^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.3354±0.0014±0.0110 60k ²⁰ ADAM 05A CLEO $e^+ e^- \rightarrow \psi(2S)$

²⁰ Not independent from other values reported by ADAM 05A.

$\Gamma(e^+ e^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$

VALUE	DOCUMENT ID	TECN	COMMENT
0.0230±0.0008 OUR FIT			
0.0252±0.0028±0.0011	²¹ AUBERT	02B	BABR $e^+ e^-$

²¹ Using $B(J/\psi(1S) \rightarrow e^+ e^-) = 0.0593 \pm 0.0010$.

$\Gamma(\mu^+\mu^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$

Γ_5/Γ_9

VALUE

DOCUMENT ID

TECN COMMENT

0.0229±0.0026 OUR FIT

0.0224±0.0029 OUR AVERAGE

0.0216±0.0026±0.0014

22 AUBERT 02B BABR e^+e^-

0.0327±0.0077±0.0072

22 GRIBUSHIN 96 FMPS 515 $\pi^- \text{Be} \rightarrow 2\mu X$

22 Using $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0588 \pm 0.0010$.

$\Gamma(\tau^+\tau^-)/\Gamma(J/\psi(1S)\pi^+\pi^-)$

Γ_6/Γ_9

VALUE (units 10^{-3})

DOCUMENT ID

TECN COMMENT

9.3 ±1.1 OUR FIT

8.73±1.39±1.57

BAI

02

BES

e^+e^-

$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\text{anything})$

Γ_9/Γ_7

VALUE

EVTS

DOCUMENT ID

TECN

COMMENT

0.5679±0.0032 OUR FIT

0.559 ±0.007 OUR AVERAGE Error includes scale factor of 1.5. See the ideogram below.

0.5637±0.0027±0.0046 60k ADAM 05A CLEO $e^+e^- \rightarrow \psi(2S)$

0.525 ±0.009 ±0.022 4090 ± 67 ANDREOTTI 05 E835 $\psi(2S) \rightarrow J/\psi X$

0.536 ±0.007 ±0.016 20k 23,24 ABLIKIM 04B BES $\psi(2S) \rightarrow J/\psi X$

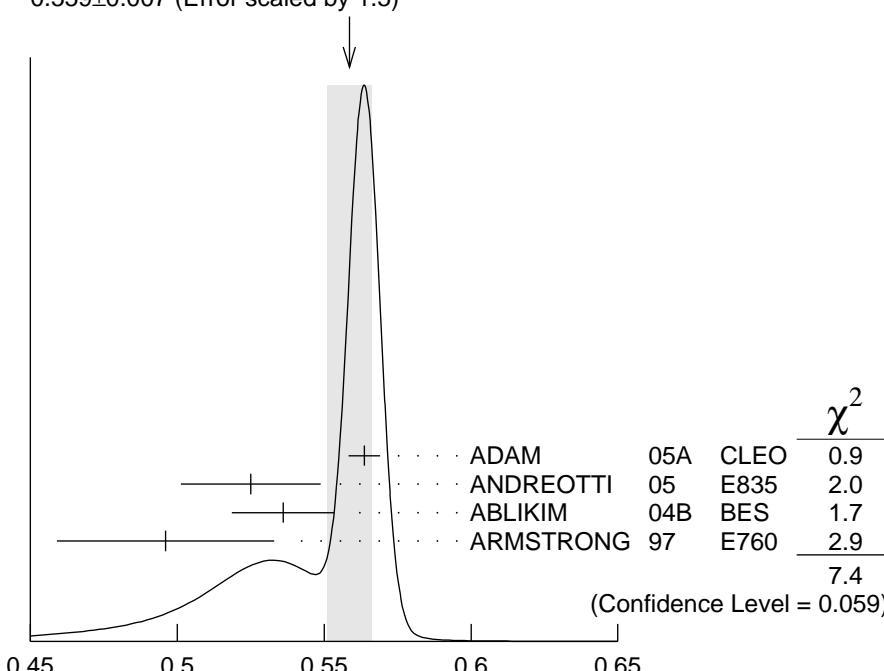
0.496 ±0.037 ARMSTRONG 97 E760 $\bar{p}p \rightarrow \psi(2S)$

23 From a fit to the J/ψ recoil mass spectra.

24 ABLIKIM 04B quotes $B(\psi(2S) \rightarrow J/\psi X) / B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-)$.

WEIGHTED AVERAGE

0.559±0.007 (Error scaled by 1.5)



$\Gamma(J/\psi(1S)\pi^+\pi^-)/\Gamma(J/\psi(1S)\text{anything})$

Γ_9/Γ_7

$\Gamma(J/\psi(1S)\text{ neutrals})/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_8/Γ_9

VALUE	DOCUMENT ID	TECN	COMMENT
0.721±0.008 OUR FIT			
0.73 ± 0.09	TANENBAUM 76	MRK1	e^+e^-

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma_{\text{total}}$ Γ_{10}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.1668±0.0034 OUR FIT				

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.1652±0.0014±0.0058 13.4k 25 ADAM 05A CLEO $e^+e^- \rightarrow \psi(2S)$

25 Not independent from other values reported by ADAM 05A.

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{10}/Γ_7

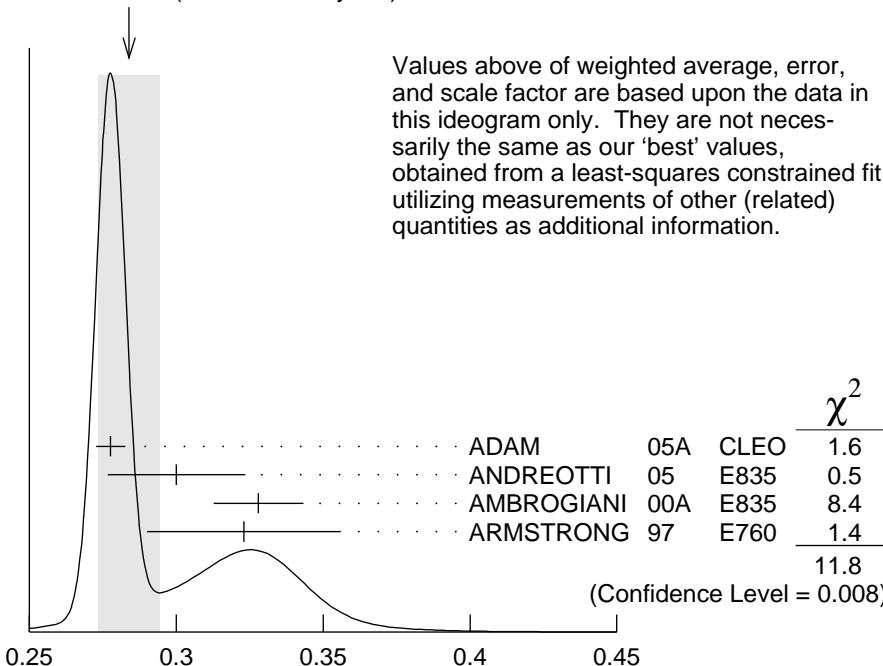
VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.2931±0.0032 OUR FIT				

0.284 ± 0.010 OUR AVERAGE Error includes scale factor of 2.3. See the ideogram below.

0.2776±0.0025±0.0043	13.4k	ADAM	05A	CLEO	$e^+e^- \rightarrow \psi(2S)$
0.300 ± 0.008 ± 0.022	1655 ± 44	ANDREOTTI	05	E835	$\psi(2S) \rightarrow J/\psi X$
0.328 ± 0.013 ± 0.008		AMBROGIANI	00A	E835	$p\bar{p} \rightarrow \psi(2S)$
0.323 ± 0.033		ARMSTRONG	97	E760	$\bar{p}p \rightarrow \psi(2S)$

WEIGHTED AVERAGE

0.284±0.010 (Error scaled by 2.3)



$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\text{anything})$ Γ_{10}/Γ_7

$\Gamma(J/\psi(1S)\pi^0\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$ Γ_{10}/Γ_9

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.516 ± 0.017 OUR FIT				
0.570 ± 0.009 ± 0.026	14k	26 ABLIKIM	04B BES	$\psi(2S) \rightarrow J/\psi X$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.4924 ± 0.0047 ± 0.0086	73k	27,28 ADAM	05A CLEO	$e^+e^- \rightarrow \psi(2S)$
0.571 ± 0.018 ± 0.044		29 ANDREOTTI	05 E835	$\psi(2S) \rightarrow J/\psi X$
0.53 ± 0.06		TANENBAUM	76 MRK1	e^+e^-
0.64 ± 0.15		30 HILGER	75 SPEC	e^+e^-

26 From a fit to the J/ψ recoil mass spectra.

27 Not independent from other values reported by ADAM 05A.

28 Using 13,217 $J/\psi\pi^0\pi^0$ and 60,010 $J/\psi\pi^+\pi^-$ events.

29 Not independent from other values reported by ANDREOTTI 05.

30 Ignoring the $J/\psi(1S)\eta$ and $J/\psi(1S)\gamma\gamma$ decays.

$\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$ Γ_{11}/Γ

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT
0.0313 ± 0.0008 OUR FIT				

0.0296 ± 0.0031 OUR AVERAGE Error includes scale factor of 1.8. See the ideogram below.

0.0298 ± 0.0009 ± 0.0023	5.7k	BAI	04I BES2	$\psi(2S) \rightarrow J/\psi\gamma\gamma$
0.0255 ± 0.0029	386	31 OREGLIA	80 CBAL	$e^+e^- \rightarrow J/\psi 2\gamma$
0.045 ± 0.012	17	32 BRANDELIK	79B DASP	$e^+e^- \rightarrow J/\psi 2\gamma$
0.042 ± 0.006	164	32 BARTEL	78B CNTR	e^+e^-

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0325 ± 0.0006 ± 0.0011

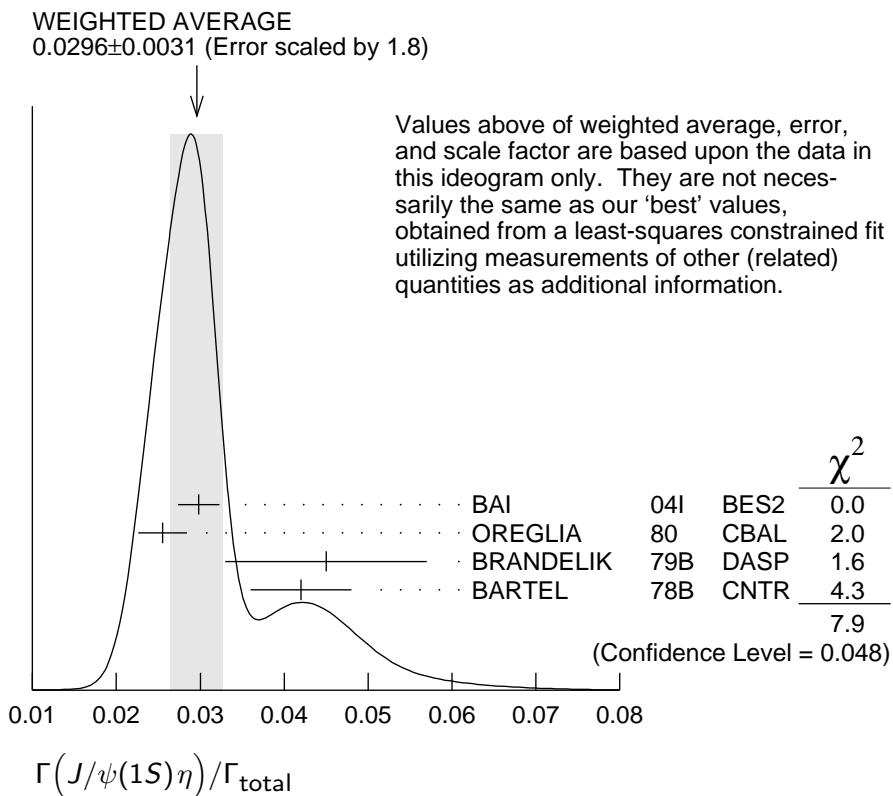
2.8k 33 ADAM 05A CLEO $e^+e^- \rightarrow \psi(2S)$

0.043 ± 0.008 44 TANENBAUM 76 MRK1 e^+e^-

31 Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.1181 \pm 0.0020$.

32 Recalculated by us using $B(J/\psi(1S) \rightarrow \mu^+\mu^-) = 0.0588 \pm 0.0010$.

33 Not independent from other values reported by ADAM 05A.



$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\text{anything})$

VALUE EVTS

0.0550±0.0011 OUR FIT

0.0548±0.0012 OUR AVERAGE

0.0546±0.0010±0.0007	2.8k
0.050 ± 0.006 ± 0.003	298 ± 20
0.072 ± 0.009	
0.061 ± 0.015	

DOCUMENT ID

TECN

COMMENT

Γ_{11}/Γ_7

ADAM	05A	CLEO	$e^+ e^- \rightarrow \psi(2S)$
ANDREOTTI	05	E835	$\psi(2S) \rightarrow J/\psi X$
AMBROGIANI	00A	E835	$p\bar{p} \rightarrow \psi(2S)$
ARMSTRONG	97	E760	$\bar{p}p \rightarrow \psi(2S)$

$\Gamma(J/\psi(1S)\eta)/\Gamma(J/\psi(1S)\pi^+\pi^-)$

VALUE EVTS

0.0969±0.0035 OUR FIT

0.096 ± 0.010 OUR AVERAGE

0.098 ± 0.005 ± 0.010	2k
0.091 ± 0.021	

DOCUMENT ID

TECN

COMMENT

Γ_{11}/Γ_9

34 ABLIKIM	04B	BES	$\psi(2S) \rightarrow J/\psi X$
35 HIMEL	80	MRK2	$e^+ e^- \rightarrow \psi(2S)X$

• • • We do not use the following data for averages, fits, limits, etc. • • •

0.0968±0.0019±0.0013	2.8k
0.095 ± 0.007 ± 0.007	

36 ADAM 05A CLEO $e^+ e^- \rightarrow \psi(2S)$

37 ANDREOTTI 05 E835 $\psi(2S) \rightarrow J/\psi X$

34 From a fit to the J/ψ recoil mass spectra.

35 The value for $B(\psi(2S) \rightarrow J/\psi(1S)\eta)$ reported in HIMEL 80 is derived using $B(\psi(2S)) \rightarrow J/\psi(1S)\pi^+\pi^-) = (33 \pm 3)\%$ and $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = 0.138 \pm 0.018$. Calculated by us using $B(J/\psi(1S) \rightarrow \ell^+\ell^-) = (0.1181 \pm 0.0020)$.

36 Not independent from other values reported by ADAM 05A.

37 Not independent from other values reported by ANDREOTTI 05.

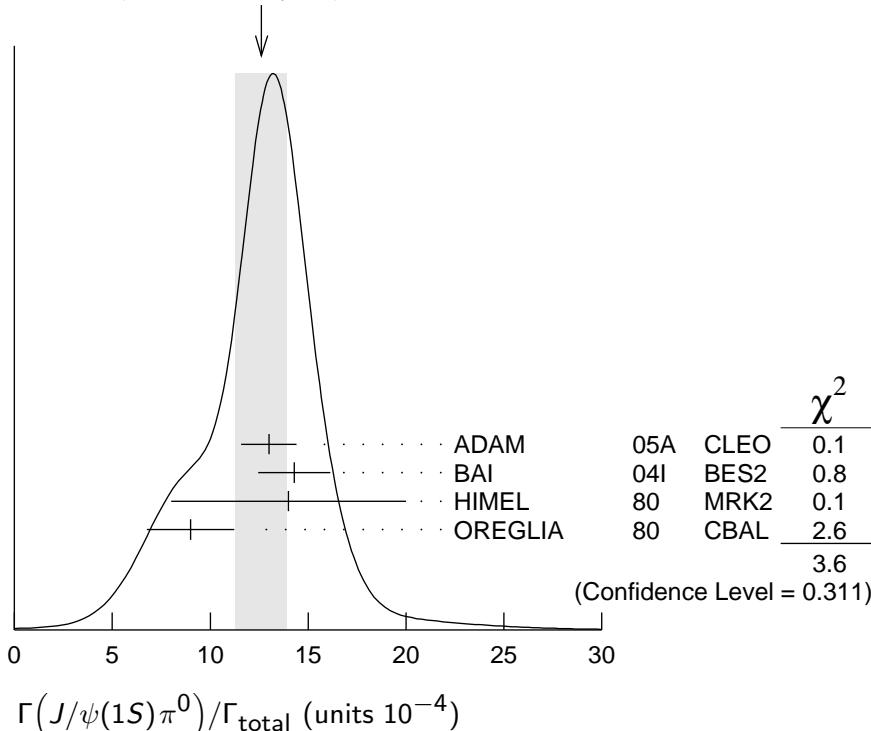
$\Gamma(J/\psi(1S)\pi^0)/\Gamma_{\text{total}}$

Γ_{12}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
12.6±1.3 OUR AVERAGE	Error includes scale factor of 1.3. See the ideogram below.			
13 ± 1 ± 1	88	ADAM	05A	CLEO $e^+ e^- \rightarrow \psi(2S)$
14.3±1.4±1.2	280	BAI	04I	BES2 $\psi(2S) \rightarrow J/\psi\gamma\gamma$
14 ± 6	7	HIMEL	80	MRK2 $e^+ e^-$
9 ± 2 ± 1	23	³⁸ OREGLIA	80	CBAL $\psi(2S) \rightarrow J/\psi 2\gamma$

³⁸ Recalculated by us using $B(J/\psi(1S) \rightarrow \ell^+ \ell^-) = 0.1181 \pm 0.0020$.

WEIGHTED AVERAGE
12.6±1.3 (Error scaled by 1.3)



$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\text{anything})$

Γ_{12}/Γ_7

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.22±0.02±0.01 ³⁹ ADAM 05A CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow J/\psi\gamma\gamma$

³⁹ Not independent from other values reported by ADAM 05A.

$\Gamma(J/\psi(1S)\pi^0)/\Gamma(J/\psi(1S)\pi^+\pi^-)$

Γ_{12}/Γ_9

VALUE (units 10^{-2})	DOCUMENT ID	TECN	COMMENT
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• • • We do not use the following data for averages, fits, limits, etc. • • •

0.39±0.04±0.01 ⁴⁰ ADAM 05A CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow J/\psi\gamma\gamma$

⁴⁰ Not independent from other values reported by ADAM 05A.

HADRONIC DECAYS **$\Gamma(3(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
35 ± 16	6	FRANKLIN	83	MRK2 $e^+ e^- \rightarrow$ hadrons

 Γ_{13}/Γ **$\Gamma(2(\pi^+\pi^-)\pi^0)/\Gamma_{\text{total}}$**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
26.6 ± 2.9 OUR AVERAGE				
$26.1 \pm 0.7 \pm 3.0$	1702.6	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$
30 ± 8	42	FRANKLIN	83	MRK2 $e^+ e^-$

 Γ_{14}/Γ **$\Gamma(\rho a_2(1320))/\Gamma_{\text{total}}$**

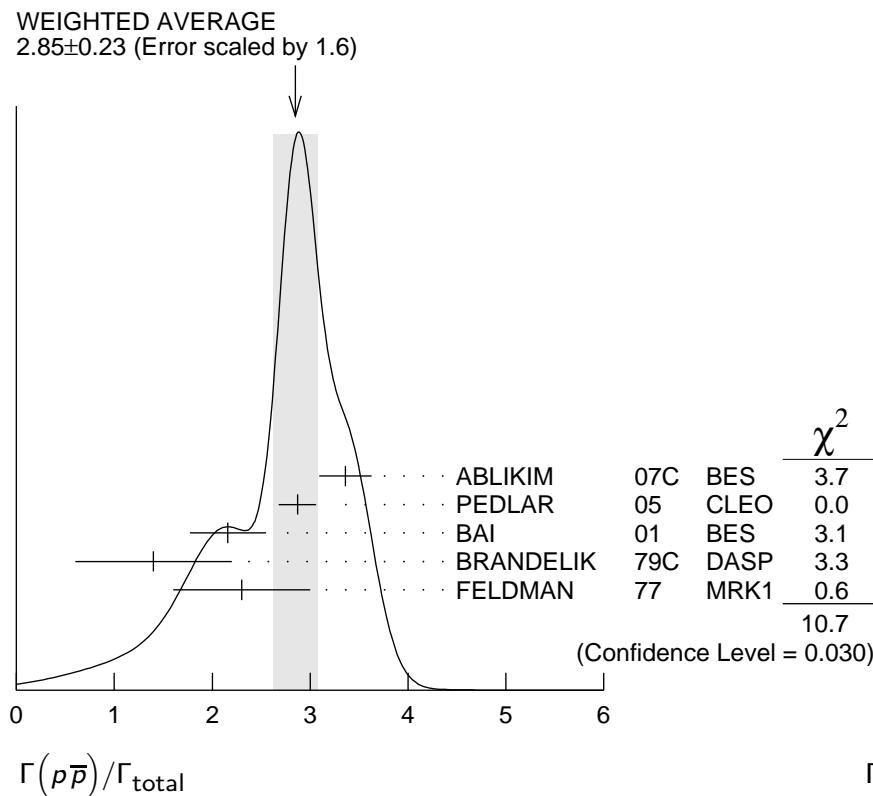
<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$2.55 \pm 0.73 \pm 0.47$		112 ± 31	BAI	04C BES2	$\psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.3		90	BAI	98J BES	$e^+ e^-$

 Γ_{15}/Γ **$\Gamma(p\bar{p})/\Gamma_{\text{total}}$**

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.85 ± 0.23 OUR AVERAGE				Error includes scale factor of 1.6. See the ideogram below.
$3.36 \pm 0.09 \pm 0.25$	1618	ABLIKIM	07C BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
$2.87 \pm 0.12 \pm 0.15$	557	PEDLAR	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
$2.16 \pm 0.15 \pm 0.36$	201	BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
1.4 ± 0.8	4	BRANDELIK	79C DASP	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$
2.3 ± 0.7		FELDMAN	77 MRK1	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}$

 Γ_{16}/Γ

⁴¹ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.



$$\Gamma(p\bar{p})/\Gamma_{\text{total}}$$

$$\Gamma_{16}/\Gamma$$

$$\Gamma(\Delta^{++}\bar{\Delta}^{--})/\Gamma_{\text{total}}$$

$$\Gamma_{17}/\Gamma$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
12.8±1.0±3.4	157	42 BAI	01 BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

⁴² Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.

$$\Gamma(\Lambda\bar{\Lambda})/\Gamma_{\text{total}}$$

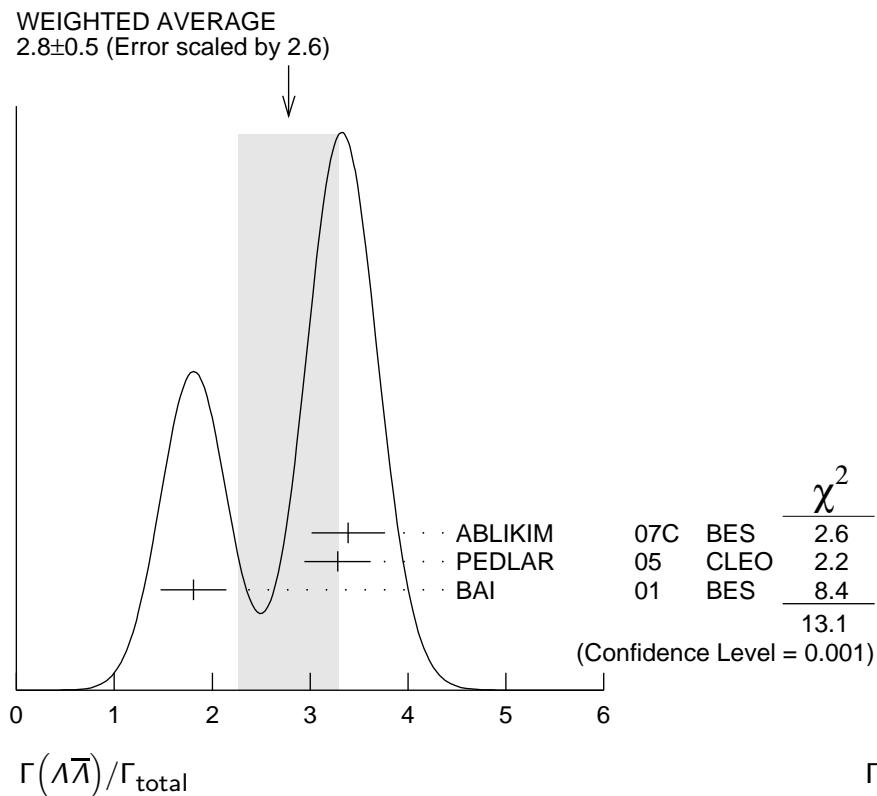
$$\Gamma_{18}/\Gamma$$

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.8 ± 0.5 OUR AVERAGE	Error includes scale factor of 2.6. See the ideogram below.				
3.39±0.20±0.32		337	ABLIKIM	07C BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
3.28±0.23±0.25		208	PEDLAR	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
1.81±0.20±0.27		80	43 BAI	01 BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 4 90 FELDMAN 77 MRK1 $e^+e^- \rightarrow \psi(2S) \rightarrow$
hadrons

⁴³ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.



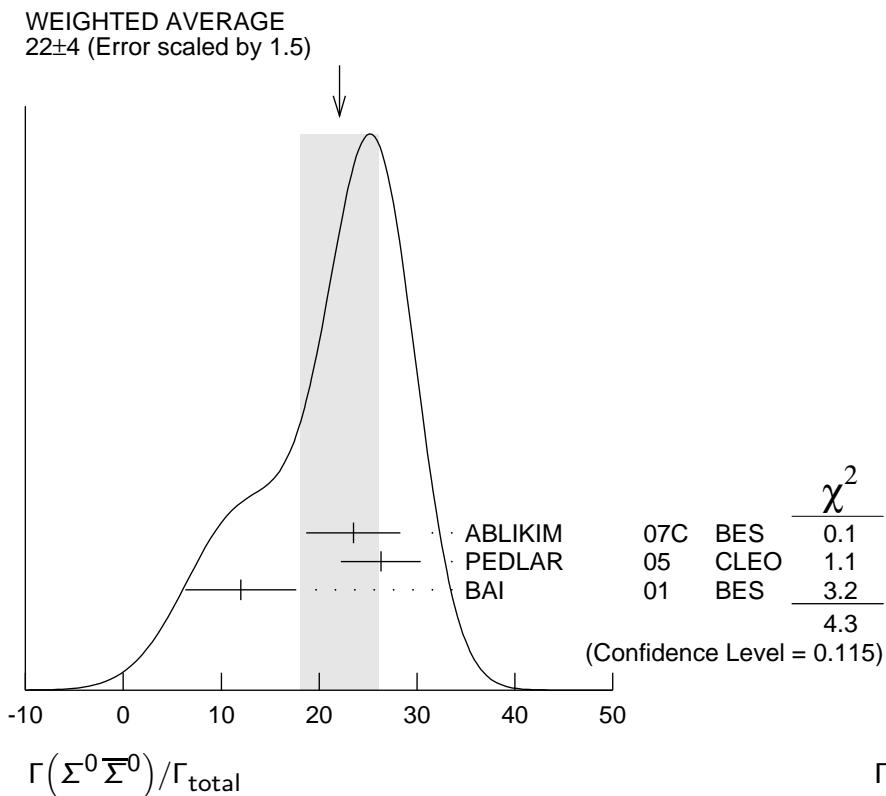
$\Gamma(\Sigma^+\bar{\Sigma}^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
25.7±4.4±6.8	35	PEDLAR	05	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$\Gamma(\Sigma^0\bar{\Sigma}^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
22 ±4 OUR AVERAGE				Error includes scale factor of 1.5. See the ideogram below.
23.5±3.6±3.2	59	ABLIKIM	07C	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
26.3±3.5±2.1	58	PEDLAR	05	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
12 ±4 ±4	8	⁴⁴ BAI	01	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

⁴⁴ Estimated using $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.310 \pm 0.028$.



$$\Gamma(\Sigma(1385)^+ \bar{\Sigma}(1385)^-)/\Gamma_{\text{total}} \quad \Gamma_{21}/\Gamma$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
11±3±3	14	45 BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons

⁴⁵ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.

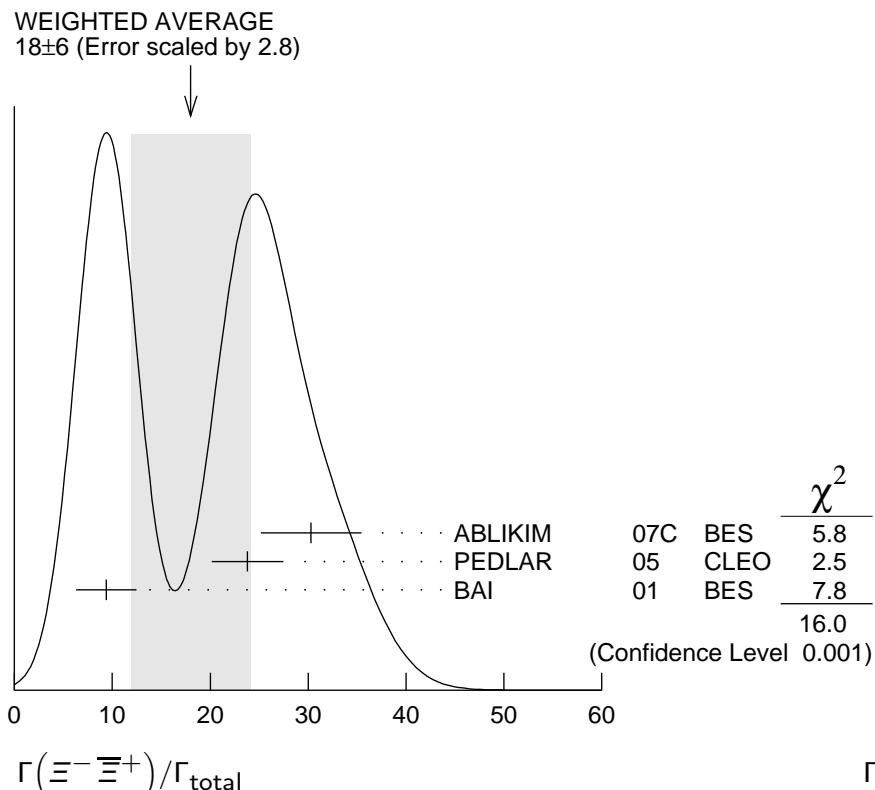
$$\Gamma(\Xi^- \bar{\Xi}^+)/\Gamma_{\text{total}} \quad \Gamma_{22}/\Gamma$$

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
18 ±6 OUR AVERAGE			Error includes scale factor of 2.8. See the ideogram below.		
30.3±4.0±3.2	67	ABLIKIM	07C BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons	
23.8±3.0±2.1	63	PEDLAR	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons	
9.4±2.7±1.5	12	46 BAI	01 BES	$e^+ e^- \rightarrow \psi(2S) \rightarrow$ hadrons	

• • • We do not use the following data for averages, fits, limits, etc. • • •

<20 90 FELDMAN 77 MRK1 $e^+ e^- \rightarrow \psi(2S) \rightarrow$
hadrons

⁴⁶ Estimated using $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.310 \pm 0.028$.



$$\Gamma(\Xi^0\bar{\Xi}^0)/\Gamma_{\text{total}} \quad \Gamma_{22}/\Gamma$$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
$27.5 \pm 6.4 \pm 6.1$	19	PEDLAR	05	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

$$\Gamma(\Xi(1530)^0\bar{\Xi}(1530)^0)/\Gamma_{\text{total}} \quad \Gamma_{24}/\Gamma$$

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
< 8.1	90	47 BAI	01 BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				

<32 90 PEDLAR 05 CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

⁴⁷ Estimated using $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.310 \pm 0.028$.

$$\Gamma(\Omega^-\bar{\Omega}^+)/\Gamma_{\text{total}} \quad \Gamma_{25}/\Gamma$$

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
< 7.3	90	48 BAI	01 BES	$e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons
• • • We do not use the following data for averages, fits, limits, etc. • • •				

<16 90 PEDLAR 05 CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow$ hadrons

⁴⁸ Estimated using $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.310 \pm 0.028$.

$$\Gamma(\pi^0 p\bar{p})/\Gamma_{\text{total}} \quad \Gamma_{26}/\Gamma$$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.33±0.17 OUR AVERAGE				
1.32±0.10±0.15	256 ± 18	49 ABLIKIM	05E BES2	$e^+e^- \rightarrow \psi(2S) \rightarrow$ $p\bar{p}\gamma\gamma$
1.4 ± 0.5	9	FRANKLIN	83 MRK2	e^+e^-

⁴⁹ Computed using $B(\pi^0 \rightarrow \gamma\gamma) = (98.80 \pm 0.03)\%$.

$\Gamma(\eta p\bar{p})/\Gamma_{\text{total}}$

Γ_{27}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.60±0.12 OUR AVERAGE				
0.58±0.11±0.07	44.8 ± 8.5	50 ABLIKIM	05E BES2	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\gamma\gamma$
0.8 ± 0.3 ± 0.3	9.8	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\pi^0$

⁵⁰ Computed using $B(\eta \rightarrow \gamma\gamma) = (39.43 \pm 0.26)\%$.

$\Gamma(\omega p\bar{p})/\Gamma_{\text{total}}$

Γ_{28}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
0.69±0.21 OUR AVERAGE				
0.6 ± 0.2 ± 0.2	21.2	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\pi^0$
0.8 ± 0.3 ± 0.1	14.9 ± 0.1	51 BAI	03B BES	$\psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\pi^0$

⁵¹ Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma(\phi p\bar{p})/\Gamma_{\text{total}}$

Γ_{29}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<0.24	90	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+K^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.26 90 52 BAI 03B BES $\psi(2S) \rightarrow K^+K^-p\bar{p}$

⁵² Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma(\pi^+\pi^-p\bar{p})/\Gamma_{\text{total}}$

Γ_{30}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
6.0±0.4 OUR AVERAGE				
5.9±0.2±0.4	904.5	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\pi^+\pi^-$
8 ± 2		53 TANENBAUM	78 MRK1	$e^+ e^-$

⁵³ Assuming entirely strong decay.

$\Gamma(p\bar{n}\pi^- \text{ or c.c.})/\Gamma_{\text{total}}$

Γ_{31}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.48±0.17 OUR AVERAGE				
2.45±0.11±0.21	851	ABLIKIM	06I BES2	$e^+ e^- \rightarrow p\pi^- X$
2.52±0.12±0.22	849	ABLIKIM	06I BES2	$e^+ e^- \rightarrow \bar{p}\pi^+ X$

$\Gamma(p\bar{n}\pi^-\pi^0)/\Gamma_{\text{total}}$

Γ_{32}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.18±0.50±0.50	135 ± 21	ABLIKIM	06I BES2	$e^+ e^- \rightarrow p\pi^-\pi^0 X$

$\Gamma(\eta\pi^+\pi^-)/\Gamma_{\text{total}}$

Γ_{34}/Γ

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT
<1.6	90	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$

$\Gamma(\eta\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

Γ_{35}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
9.5±0.7±1.5		54 BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \eta\pi^+\pi^-\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
10.3±0.8±1.4	201.7	55 BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \eta 3\pi (\eta \rightarrow \gamma\gamma)$
8.1±1.4±1.6	50.0	55 BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \eta 3\pi (\eta \rightarrow 3\pi)$

54 Average of $\eta \rightarrow \gamma\gamma$ and $\eta \rightarrow 3\pi$.

55 Not independent from other values reported by BRIERE 05.

$\Gamma(\eta'\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

Γ_{36}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
4.5±1.6±1.3	12.8	BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow \eta\pi^+\pi^-\pi^0$

$\Gamma(\omega\pi^+\pi^-)/\Gamma_{\text{total}}$

Γ_{37}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
6.6±1.7 OUR AVERAGE				Error includes scale factor of 2.7.
8.2±0.5±0.7	391	BRIERE	05 CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$
4.8±0.6±0.7	100 ± 22	56 BAI	03B BES	$\psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$

56 Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma(b_1^\pm\pi^\mp)/\Gamma_{\text{total}}$

Γ_{38}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.6 ± 0.6 OUR AVERAGE				
4.18 ^{+0.43} _{-0.42} ± 0.92	170	ADAM	05 CLEO	$e^+e^- \rightarrow \psi(2S)$
3.2 ± 0.6 ± 0.5	61 ± 11	57,58 BAI	03B BES	$\psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
5.2 ± 0.8 ± 1.0		57 BAI	99C BES	Repl. by BAI 03B

57 Assuming $B(b_1 \rightarrow \omega\pi)=1$.

58 Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma(b_1^0\pi^0)/\Gamma_{\text{total}}$

Γ_{39}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
2.35^{+0.47}_{-0.42} ± 0.40	45	ADAM	05 CLEO	$e^+e^- \rightarrow \psi(2S)$

$\Gamma(\omega f_2(1270))/\Gamma_{\text{total}}$

Γ_{40}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
2.05±0.41±0.38		62±12	BAI	04C BES2	$\psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<1.5	90	59 BAI	03B BES	$\psi(2S) \rightarrow 2(\pi^+\pi^-)\pi^0$	
<1.7	90	BAI	98J BES		Repl. by BAI 03B

59 Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.

$\Gamma(\pi^+\pi^-K^+K^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4}) EVTS

7.2±0.5 OUR AVERAGE

$7.1 \pm 0.3 \pm 0.4$ 817.2

16 ± 4

60 Assuming entirely strong decay.

Γ_{41}/Γ

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BRIERE 05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow K^+K^-\pi^+\pi^-$
TANENBAUM 78	MRK1	e^+e^-

$\Gamma(\rho^0 K^+ K^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4}) EVTS

2.2±0.2±0.4 223.8

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BRIERE 05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow K^+K^-\pi^+\pi^-$

Γ_{42}/Γ

$\Gamma(K^*(892)^0 \bar{K}_2^*(1430)^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-4}) CL% EVTS

1.86±0.32±0.43 93 ± 16

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.2 90

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BAI 04C	CLEO	$\psi(2S) \rightarrow K^+K^-\pi^+\pi^-$

Γ_{43}/Γ

$\Gamma(K_1(1270)^{\pm} K^{\mp})/\Gamma_{\text{total}}$

VALUE (units 10^{-4})

10.0±1.8±2.1

61 Assuming $B(K_1(1270) \rightarrow K\rho) = 0.42 \pm 0.06$

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BAI 99C	BES	e^+e^-

Γ_{45}/Γ

$\Gamma(K_S^0 K_S^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4}) EVTS

2.20±0.25±0.37 83 ± 9

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
ABLIKIM 050	BES2	$e^+e^- \rightarrow \psi(2S)$

Γ_{46}/Γ

$\Gamma(\rho^0 p\bar{p})/\Gamma_{\text{total}}$

VALUE (units 10^{-4}) EVTS

0.5±0.1 ±0.2 61.1

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BRIERE 05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\pi^+\pi^-$

Γ_{47}/Γ

$\Gamma(K^+\bar{K}^*(892)^0 \pi^- + \text{c.c.})/\Gamma_{\text{total}}$

VALUE (units 10^{-4})

6.7±2.5

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
TANENBAUM 78	MRK1	e^+e^-

Γ_{48}/Γ

$\Gamma(2(\pi^+\pi^-))/\Gamma_{\text{total}}$

VALUE (units 10^{-4}) EVTS

2.4±0.6 OUR AVERAGE

Error includes scale factor of 2.2.

$2.2 \pm 0.2 \pm 0.2$ 308

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
BRIERE 05	CLEO	$e^+e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+\pi^-)$

Γ_{49}/Γ

4.5 ± 1.0

<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
TANENBAUM 78	MRK1	e^+e^-

$\Gamma(\rho^0 \pi^+ \pi^-)/\Gamma_{\text{total}}$ Γ_{50}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.2 ± 0.6 OUR AVERAGE	Error includes scale factor of 1.4.			
$2.0 \pm 0.2 \pm 0.4$	285.5	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow 2(\pi^+ \pi^-)$
4.2 ± 1.5		TANENBAUM	78	MRK1 $e^+ e^-$

 $\Gamma(K^+ K^- \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$ Γ_{51}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$12.4^{+1.0}_{-0.9}$ OUR AVERAGE				
$11.7 \pm 1.0 \pm 1.5$	597	ABLIKIM	06G	BES2 $\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
$12.7 \pm 0.5 \pm 1.0$	711.6	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

 $\Gamma(\omega f_0(1710) \rightarrow \omega K^+ K^-)/\Gamma_{\text{total}}$ Γ_{52}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$5.9 \pm 2.0 \pm 0.9$	19	ABLIKIM	06G	BES2 $\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

 $\Gamma(K^*(892)^0 K^- \pi^+ \pi^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{53}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$8.6 \pm 1.3 \pm 1.8$	238	ABLIKIM	06G	BES2 $\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

 $\Gamma(K^*(892)^+ K^- \pi^+ \pi^- + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{54}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$9.6 \pm 2.2 \pm 1.7$	133	ABLIKIM	06G	BES2 $\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

 $\Gamma(K^*(892)^+ K^- \rho^0 + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{55}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$7.3 \pm 2.2 \pm 1.4$	78	ABLIKIM	06G	BES2 $\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

 $\Gamma(K^*(892)^0 K^- \rho^+ + \text{c.c.})/\Gamma_{\text{total}}$ Γ_{56}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$6.1 \pm 1.3 \pm 1.2$	125	ABLIKIM	06G	BES2 $\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

 $\Gamma(\eta K^+ K^-)/\Gamma_{\text{total}}$ Γ_{57}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.3	90	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

$\Gamma(\omega K^+ K^-)/\Gamma_{\text{total}}$

Γ_{58}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.85 ± 0.25 OUR AVERAGE				Error includes scale factor of 1.1.
2.38 ± 0.37 ± 0.29	78	ABLIKIM	06G BES2	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1.9 ± 0.3 ± 0.3	76.8	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$
1.5 ± 0.3 ± 0.2	23.0 ± 5.2	62 BAI	03B BES	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^- \pi^0$

⁶² Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.

$\Gamma(3(\pi^+ \pi^-))/\Gamma_{\text{total}}$

Γ_{59}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
3.5 ± 2.0 OUR AVERAGE				Error includes scale factor of 2.8.
5.45 ± 0.42 ± 0.87	671	ABLIKIM	05H BES2	$e^+ e^- \rightarrow \psi(2S) \rightarrow 3(\pi^+ \pi^-)$
1.5 ± 1.0		63 TANENBAUM	78 MRK1	$e^+ e^-$

⁶³ Assuming entirely strong decay.

$\Gamma(p\bar{p}\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

Γ_{60}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
7.3 ± 0.4 ± 0.6	434.9	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}\pi^+\pi^-\pi^0$

$\Gamma(K^+ K^-)/\Gamma_{\text{total}}$

Γ_{61}/Γ

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT
6.3 ± 0.7 OUR AVERAGE				
6.3 ± 0.6 ± 0.3		DOBBS	06A CLEO	$e^+ e^-$
10 ± 7		BRANDELIK	79C DASP	$e^+ e^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
< 5	90	FELDMAN	77 MRK1	$e^+ e^-$

$\Gamma(K_S^0 K_L^0)/\Gamma_{\text{total}}$

Γ_{62}/Γ

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT
5.4 ± 0.5 OUR AVERAGE				
5.8 ± 0.8 ± 0.4		DOBBS	06A CLEO	$e^+ e^-$
5.24 ± 0.47 ± 0.48	156 ± 14	64 BAI	04B BES2	$\psi(2S) \rightarrow K_S^0 K_L^0 \rightarrow \pi^+ \pi^- X$

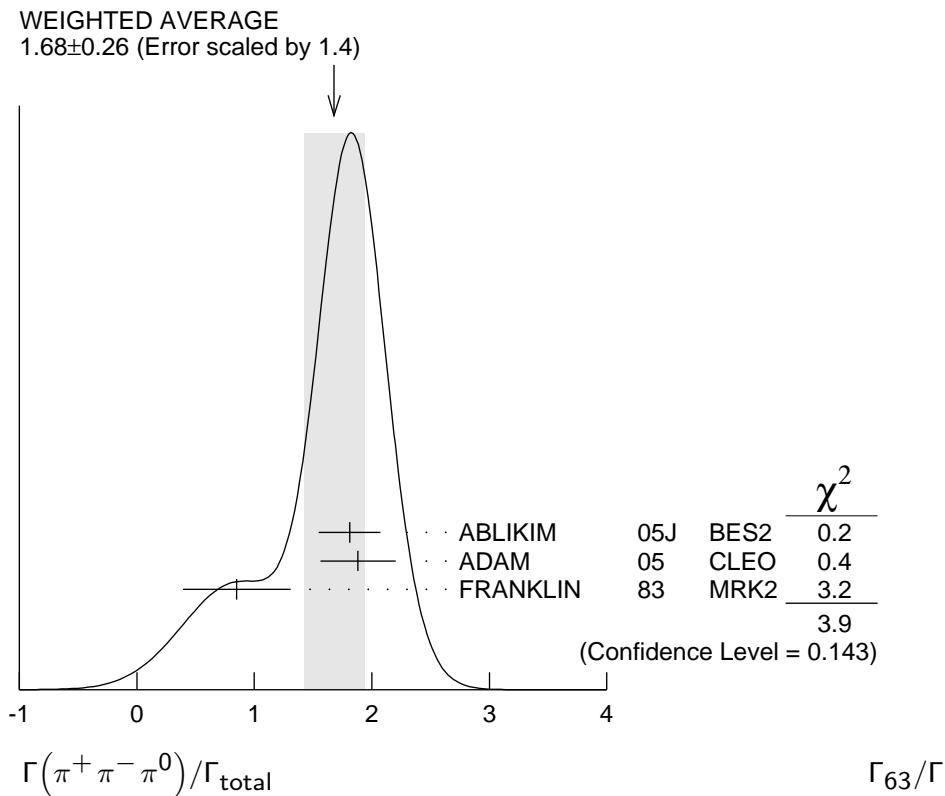
⁶⁴ Using $B(K_S^0 \rightarrow \pi^+ \pi^-) = 0.6860 \pm 0.0027$.

$\Gamma(\pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$

Γ_{63}/Γ

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT
1.68 ± 0.26 OUR AVERAGE				Error includes scale factor of 1.4. See the ideogram below.
1.81 ± 0.18 ± 0.19	260 ± 19	65 ABLIKIM	05J BES2	$e^+ e^- \rightarrow \psi(2S)$
1.88 ^{+0.16} _{-0.15} ± 0.28	194	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$
0.85 ± 0.46	4	FRANKLIN	83 MRK2	$e^+ e^- \rightarrow \text{hadrons}$

65 From a PW analysis of $\psi(2S) \rightarrow \pi^+ \pi^- \pi^0$.



$\Gamma(\rho(2150)\pi \rightarrow \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$

Γ_{64}/Γ

VALUE (units 10^{-4})	DOCUMENT ID	TECN	COMMENT
$1.94 \pm 0.25^{+1.15}_{-0.34}$	66 ABLIKIM	05J	$\psi(2S) \rightarrow \rho(2150)\pi \rightarrow \pi^+ \pi^- \pi^0$

66 From a PW analysis of $\psi(2S) \rightarrow \pi^+ \pi^- \pi^0$.

$\Gamma(\rho(770)\pi \rightarrow \pi^+ \pi^- \pi^0)/\Gamma_{\text{total}}$

Γ_{65}/Γ

VALUE (units 10^{-4})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT
0.32 ± 0.12 OUR AVERAGE			Error includes scale factor of 1.8.		
$0.51 \pm 0.07 \pm 0.11$			67 ABLIKIM	05J	$\psi(2S) \rightarrow \rho(770)\pi \rightarrow \pi^+ \pi^- \pi^0$
$0.24^{+0.08}_{-0.07} \pm 0.02$		22	ADAM	05	$e^+ e^- \rightarrow \psi(2S)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.83	90	1	FRANKLIN	83	MRK2	$e^+ e^-$
<10	90		BARTEL	76	CNTR	$e^+ e^-$
<10	90	68	ABRAMS	75	MRK1	$e^+ e^-$

67 From a PW analysis of $\psi(2S) \rightarrow \pi^+ \pi^- \pi^0$.

68 Final state $\rho^0 \pi^0$.

$\Gamma(\pi^+\pi^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	CL%	DOCUMENT ID	TECN	COMMENT	Γ_{66}/Γ
8 ± 5		BRANDELIK	79C	DASP e^+e^-	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<2.1	90	DOBBS	06A	CLEO $e^+e^- \rightarrow \psi(2S)$	
<5	90	FELDMAN	77	MRK1 e^+e^-	

$\Gamma(K_1(1400)^{\pm} K^{\mp})/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	CL%	DOCUMENT ID	TECN	COMMENT	Γ_{67}/Γ
<3.1	90	BAI	99C	BES e^+e^-	
69 Assuming $B(K_1(1400) \rightarrow K^*\pi) = 0.94 \pm 0.06$					

$\Gamma(K^+K^-\pi^0)/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{68}/Γ
<2.96	90	1	FRANKLIN	83	MRK2 $e^+e^- \rightarrow \text{hadrons}$	

$\Gamma(K^+\bar{K}^*(892)^- + \text{c.c.})/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	CL%	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{69}/Γ
1.7^{+0.8}_{-0.7} OUR AVERAGE						
2.9 ^{+1.3} _{-1.7} ^{± 0.4}		9.6 ± 4.2	ABLIKIM	05I	BES2 $e^+e^- \rightarrow \psi(2S)$	
1.3 ^{+1.0} _{-0.7} ^{± 0.3}		7	ADAM	05	CLEO $e^+e^- \rightarrow \psi(2S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •						
<5.4	90		FRANKLIN	83	MRK2 $e^+e^- \rightarrow \text{hadrons}$	

$\Gamma(K^*(892)^0\bar{K}^0 + \text{c.c.})/\Gamma_{\text{total}}$

VALUE (units 10^{-5})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{70}/Γ
10.9^{± 2.0} OUR AVERAGE					
13.3 ^{+2.4} _{-2.8} ^{± 1.7}	65.6 ± 9.0	ABLIKIM	05I	BES2 $e^+e^- \rightarrow \psi(2S)$	
9.2 ^{+2.7} _{-2.2} ^{± 0.9}	25	ADAM	05	CLEO $e^+e^- \rightarrow \psi(2S)$	

$\Gamma(K^+\bar{K}^*(892)^- + \text{c.c.})/\Gamma(K^*(892)^0\bar{K}^0 + \text{c.c.})$

VALUE	DOCUMENT ID	TECN	COMMENT	Γ_{69}/Γ_{70}
0.16^{± 0.06} OUR AVERAGE				
0.22 ^{+0.10} _{-0.14}	ABLIKIM	05I	BES2 $e^+e^- \rightarrow \psi(2S)$	
0.14 ^{+0.08} _{-0.06}	ADAM	05	CLEO $e^+e^- \rightarrow \psi(2S)$	

$\Gamma(\phi\pi^+\pi^-)/\Gamma_{\text{total}}$

VALUE (units 10^{-4})	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_{71}/Γ
1.13^{± 0.29} OUR AVERAGE Error includes scale factor of 1.7.					
0.9 ± 0.2 ± 0.1	47.6	BRIERE	05	CLEO $e^+e^- \rightarrow \psi(2S) \rightarrow K^+K^-\pi^+\pi^-$	
1.5 ± 0.2 ± 0.2	51.5 ± 8.3	70 BAI	03B	BES $\psi(2S) \rightarrow K^+K^-\pi^+\pi^-$	
70 Normalized to $B(\psi(2S) \rightarrow J/\psi\pi^+\pi^-) = 0.305 \pm 0.016$.					

$\Gamma(\phi f_0(980) \rightarrow \pi^+ \pi^-)/\Gamma_{\text{total}}$

Γ_{72}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.6±0.2 ±0.1	18.4 ± 6.4	71 BAI	03B BES	$\psi(2S) \rightarrow K^+ K^- \pi^+ \pi^-$

⁷¹ Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.

$\Gamma(2(K^+ K^-))/\Gamma_{\text{total}}$

Γ_{73}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.6±0.1 ±0.1	59.2	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(K^+ K^-)$

$\Gamma(\phi K^+ K^-)/\Gamma_{\text{total}}$

Γ_{74}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.70±0.16 OUR AVERAGE				
0.8 ± 0.2 ± 0.1	36.8	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(K^+ K^-)$

⁷² Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.

$\Gamma(2(K^+ K^-)\pi^0)/\Gamma_{\text{total}}$

Γ_{75}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.1±0.2 ±0.2	44.7	BRIERE	05 CLEO	$e^+ e^- \rightarrow \psi(2S) \rightarrow 2(K^+ K^-)\pi^0$

$\Gamma(\phi\eta)/\Gamma_{\text{total}}$

Γ_{76}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.8$^{+1.0}_{-0.8}$ OUR AVERAGE				
$2.0^{+1.5}_{-1.1} \pm 0.4$	6	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$
$3.3 \pm 1.1 \pm 0.5$	17	ABLIKIM	04K BES	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\phi\eta')/\Gamma_{\text{total}}$

Γ_{77}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.1±1.4±0.7	8	73 ABLIKIM	04K BES	$e^+ e^- \rightarrow \psi(2S)$

⁷³ Calculated combining $\eta' \rightarrow \gamma\rho$ and $\eta\pi^+\pi^-$ channels.

$\Gamma(\omega\eta')/\Gamma_{\text{total}}$

Γ_{78}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
3.2$^{+2.4}_{-2.0}$±0.7	4	74 ABLIKIM	04K BES	$e^+ e^- \rightarrow \psi(2S)$

⁷⁴ Calculated combining $\eta' \rightarrow \gamma\rho$ and $\eta\pi^+\pi^-$ channels.

$\Gamma(\omega\pi^0)/\Gamma_{\text{total}}$

Γ_{79}/Γ

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
2.1 ±0.6 OUR AVERAGE				
$2.5^{+1.2}_{-1.0} \pm 0.2$	14	ADAM	05 CLEO	$e^+ e^- \rightarrow \psi(2S)$
$1.87^{+0.68}_{-0.62} \pm 0.28$	14	ABLIKIM	04L BES	$e^+ e^- \rightarrow \psi(2S)$

$\Gamma(\rho\eta')/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{80}/Γ
$1.87^{+1.64}_{-1.11} \pm 0.33$	2	ABLIKIM	04L	BES $e^+ e^- \rightarrow \psi(2S)$	

$\Gamma(\rho\eta)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{81}/Γ
2.2 ± 0.6 OUR AVERAGE				Error includes scale factor of 1.1.	
$3.0^{+1.1}_{-0.9} \pm 0.2$	18	ADAM	05	CLEO $e^+ e^- \rightarrow \psi(2S)$	
$1.78^{+0.67}_{-0.62} \pm 0.17$	13	ABLIKIM	04L	BES $e^+ e^- \rightarrow \psi(2S)$	

$\Gamma(\omega\eta)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-5})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{82}/Γ
<1.1	90	ADAM	05	CLEO $e^+ e^- \rightarrow \psi(2S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<3.1	90	ABLIKIM	04K	BES $e^+ e^- \rightarrow \psi(2S)$	

$\Gamma(\phi\pi^0)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-5})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{83}/Γ
<0.4	90	ABLIKIM	04K	BES $e^+ e^- \rightarrow \psi(2S)$	
• • • We do not use the following data for averages, fits, limits, etc. • • •					
<0.7	90	ADAM	05	CLEO $e^+ e^- \rightarrow \psi(2S)$	

$\Gamma(\eta_c\pi^+\pi^-\pi^0)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-3})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{84}/Γ
<1.0	90	PEDLAR	07	CLEC $e^+ e^- \rightarrow \psi(2S)$	

$\Gamma(p\bar{p}K^+K^-)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-5})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{85}/Γ
$2.7 \pm 0.6 \pm 0.4$	30.1	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+K^-$	

$\Gamma(\Lambda\bar{\Lambda}\pi^+\pi^-)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{86}/Γ
$2.8 \pm 0.4 \pm 0.5$	73.4	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}2(\pi^+\pi^-)$	

$\Gamma(\Lambda\bar{p}K^+)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{87}/Γ
$1.0 \pm 0.1 \pm 0.1$	74.0	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+\pi^-$	

$\Gamma(\Lambda\bar{p}K^+\pi^+\pi^-)/\Gamma_{\text{total}}$

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>	Γ_{88}/Γ
$1.8 \pm 0.3 \pm 0.3$	45.8	BRIERE	05	CLEO $e^+ e^- \rightarrow \psi(2S) \rightarrow p\bar{p}K^+\pi^+\pi^-\pi^-$	

$\Gamma(\phi f'_2(1525))/\Gamma_{\text{total}}$

Γ_{89}/Γ

<u>VALUE</u> (units 10^{-4})	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.44 ± 0.12 ± 0.11		20 ± 6	BAI	04C	$\psi(2S) \rightarrow 2(K^+ K^-)$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<0.45	90	BAI	98J	BES	$e^+ e^- \rightarrow 2(K^+ K^-)$
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$\Gamma(\Theta(1540)\bar{\Theta}(1540) \rightarrow K_S^0 p K^- \bar{n} + \text{c.c.})/\Gamma_{\text{total}}$

Γ_{90}/Γ

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.88	90	BAI	04G	BES2

$\Gamma(\Theta(1540)K^- \bar{n} \rightarrow K_S^0 p K^- \bar{n})/\Gamma_{\text{total}}$

Γ_{91}/Γ

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.0	90	BAI	04G	BES2

$\Gamma(\Theta(1540)K_S^0 \bar{p} \rightarrow K_S^0 \bar{p} K^+ n)/\Gamma_{\text{total}}$

Γ_{92}/Γ

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.70	90	BAI	04G	BES2

$\Gamma(\bar{\Theta}(1540)K^+ n \rightarrow K_S^0 \bar{p} K^+ n)/\Gamma_{\text{total}}$

Γ_{93}/Γ

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<2.6	90	BAI	04G	BES2

$\Gamma(\bar{\Theta}(1540)K_S^0 p \rightarrow K_S^0 p K^- \bar{n})/\Gamma_{\text{total}}$

Γ_{94}/Γ

<u>VALUE</u> (units 10^{-5})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.60	90	BAI	04G	BES2

$\Gamma(K_S^0 K_S^0)/\Gamma_{\text{total}}$

Γ_{95}/Γ

<u>VALUE</u> (units 10^{-4})	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.046	75	BAI	04D	BES

⁷⁵ Forbidden by CP.

— RADIATIVE DECAYS —

$\Gamma(\gamma \chi_{c0}(1P))/\Gamma_{\text{total}}$

Γ_{96}/Γ

<u>VALUE</u> (units 10^{-2})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
9.3 ± 0.4 OUR FIT				
9.2 ± 0.4 OUR AVERAGE				

9.22 ± 0.11 ± 0.46 72600 ATHAR 04 CLEO $e^+ e^- \rightarrow \gamma X$

9.9 ± 0.5 ± 0.8 76 GAISER 86 CBAL $e^+ e^- \rightarrow \gamma X$

7.2 ± 2.3 76 BIDDICK 77 CNTR $e^+ e^- \rightarrow \gamma X$

7.5 ± 2.6 76 WHITAKER 76 MRK1 $e^+ e^-$

⁷⁶ Angular distribution ($1+\cos^2\theta$) assumed.

$\Gamma(\gamma\chi_{c1}(1P))/\Gamma_{\text{total}}$ Γ_{97}/Γ

<u>VALUE</u> (units 10^{-2})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8.8 ± 0.4 OUR FIT				
8.9 ± 0.5 OUR AVERAGE				
9.07 ± 0.11 ± 0.54	76700	ATHAR	04	CLEO $e^+ e^- \rightarrow \gamma X$
9.0 ± 0.5 ± 0.7		77 GAISER	86	CBAL $e^+ e^- \rightarrow \gamma X$
7.1 ± 1.9		78 BIDDICK	77	CNTR $e^+ e^- \rightarrow \gamma X$

77 Angular distribution ($1 - 0.189 \cos^2 \theta$) assumed.

78 Valid for isotropic distribution of the photon.

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma_{\text{total}}$ Γ_{98}/Γ

<u>VALUE</u> (units 10^{-2})	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8.1 ± 0.4 OUR FIT				
8.8 ± 0.5 OUR AVERAGE				Error includes scale factor of 1.1.
9.33 ± 0.14 ± 0.61	79300	ATHAR	04	CLEO $e^+ e^- \rightarrow \gamma X$
8.0 ± 0.5 ± 0.7		79 GAISER	86	CBAL $e^+ e^- \rightarrow \gamma X$
7.0 ± 2.0		80 BIDDICK	77	CNTR $e^+ e^- \rightarrow \gamma X$

79 Angular distribution ($1 - 0.052 \cos^2 \theta$) assumed.

80 Valid for isotropic distribution of the photon.

$[\Gamma(\gamma\chi_{c0}(1P)) + \Gamma(\gamma\chi_{c1}(1P)) + \Gamma(\gamma\chi_{c2}(1P))] / \Gamma_{\text{total}}$ $(\Gamma_{96} + \Gamma_{97} + \Gamma_{98}) / \Gamma$

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
27.6 ± 0.3 ± 2.0	81 ATHAR	04	CLEO $e^+ e^- \rightarrow \gamma X$

81 Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ Γ_{96}/Γ_{97}

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.02 ± 0.01 ± 0.07	82 ATHAR	04	CLEO $e^+ e^- \rightarrow \gamma X$

82 Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

$\Gamma(\gamma\chi_{c2}(1P))/\Gamma(\gamma\chi_{c1}(1P))$ Γ_{98}/Γ_{97}

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
1.03 ± 0.02 ± 0.03	83 ATHAR	04	CLEO $e^+ e^- \rightarrow \gamma X$

83 Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

$\Gamma(\gamma\chi_{c0}(1P))/\Gamma(\gamma\chi_{c2}(1P))$ Γ_{96}/Γ_{98}

<u>VALUE</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.99 ± 0.02 ± 0.08	84 ATHAR	04	CLEO $e^+ e^- \rightarrow \gamma X$

84 Not independent from ATHAR 04 measurements of $B(\gamma\chi_{cJ})$.

$\Gamma(\gamma\eta_c(1S))/\Gamma_{\text{total}}$ Γ_{99}/Γ

<u>VALUE (units 10^{-2})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.30 ± 0.05 OUR AVERAGE				
$0.32 \pm 0.04 \pm 0.06$	2560	85 ATHAR	04 CLEO	$e^+ e^- \rightarrow \gamma X$
0.28 ± 0.06		86 GAISER	86 CBAL	$e^+ e^- \rightarrow \gamma X$
85 ATHAR 04 used $\Gamma_{\eta_c(1S)} = 24.8 \pm 4.9$ MeV to obtain this result.				
86 GAISER 86 used $\Gamma_{\eta_c(1S)} = 11.5 \pm 4.5$ MeV to obtain this result.				

 $\Gamma(\gamma\eta_c(2S))/\Gamma_{\text{total}}$ Γ_{100}/Γ

<u>VALUE (units 10^{-2})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 0.20	90	ATHAR	04 CLEO	$e^+ e^- \rightarrow \gamma X$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
0.2 to 1.3	95	EDWARDS	82C CBAL	$e^+ e^- \rightarrow \gamma X$

 $\Gamma(\gamma\pi^0)/\Gamma_{\text{total}}$ Γ_{101}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
< 54	95	87 LIBERMAN	75 SPEC	$e^+ e^-$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
< 100	90	WIIK	75 DASP	$e^+ e^-$

87 Restated by us using $B(\psi(2S) \rightarrow \mu^+ \mu^-) = 0.0077$. $\Gamma(\gamma\eta'(958))/\Gamma_{\text{total}}$ Γ_{102}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
1.36 ± 0.24 OUR AVERAGE					
$1.24 \pm 0.27 \pm 0.15$		23	ABLIKIM	06R BES2	$e^+ e^- \rightarrow \psi(2S)$
$1.54 \pm 0.31 \pm 0.20$		~ 43	BAI	98F BES	$\psi(2S) \rightarrow \pi^+ \pi^- 2\gamma, \pi^+ \pi^- 3\gamma$

 $\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$

< 60	90	88 BRAUNSCH...	77 DASP	$e^+ e^-$
< 11	90	89 BARTEL	76 CNTR	$e^+ e^-$

88 Restated by us using total decay width 228 keV.

89 The value is normalized to the branching ratio for $\Gamma(J/\psi(1S)\eta)/\Gamma_{\text{total}}$. $\Gamma(\gamma f_2(1270))/\Gamma_{\text{total}}$ Γ_{103}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$2.12 \pm 0.19 \pm 0.32$		90,91 BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi \pi$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
$2.08 \pm 0.19 \pm 0.33$	200.6 ± 18.8	90 BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi^+ \pi^-$
$2.90 \pm 1.08 \pm 1.07$	29.9 ± 11.1	90 BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi^0 \pi^0$

90 Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.91 Combining the results from $\pi^+ \pi^-$ and $\pi^0 \pi^0$ decay modes. $\Gamma(\gamma f_0(1710) \rightarrow \gamma \pi \pi)/\Gamma_{\text{total}}$ Γ_{105}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
$0.301 \pm 0.041 \pm 0.124$	35.6 ± 4.8	92 BAI	03C BES	$\psi(2S) \rightarrow \gamma \pi^+ \pi^-$

92 Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.

$\Gamma(\gamma f_0(1710) \rightarrow \gamma K\bar{K})/\Gamma_{\text{total}}$ Γ_{106}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.604±0.090±0.132		39.6 ± 5.9	93,94 BAI	03C BES	$\psi(2S) \rightarrow \gamma K^+ K^-$

• • • We do not use the following data for averages, fits, limits, etc. • • •

< 1.56	90	6.8 ± 3.1	93,94 BAI	03C BES	$\psi(2S) \rightarrow \gamma K_S^0 K_S^0$
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93 Includes unknown branching fractions to $K^+ K^-$ or $K_S^0 K_S^0$. We have multiplied the $K^+ K^-$ result by a factor of 2 and the $K_S^0 K_S^0$ result by a factor of 4 to obtain the $K\bar{K}$ result.
 94 Normalized to $B(\psi(2S) \rightarrow J/\psi \pi^+ \pi^-) = 0.305 \pm 0.016$.

 $\Gamma(\gamma\eta)/\Gamma_{\text{total}}$ Γ_{108}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.9	90	BAI	98F BES	$\psi(2S) \rightarrow \pi^+ \pi^- 3\gamma$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<2	90	YAMADA	77 DASP	$e^+ e^- \rightarrow 3\gamma$
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 $\Gamma(\gamma\eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{109}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
8.71±1.25±1.64	418	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$

 $\Gamma(\gamma\eta(1405) \rightarrow \gamma K\bar{K}\pi)/\Gamma_{\text{total}}$ Γ_{111}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.9	90	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma K_S^0 K^+ \pi^- + \text{c.c.}$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.3	90	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$
<1.2	90	95 SCHARRE	80 MRK1	$e^+ e^- \rightarrow \gamma K\bar{K}\pi$

95 Includes unknown branching fraction $\eta(1405) \rightarrow K\bar{K}\pi$.

 $\Gamma(\gamma\eta(1405) \rightarrow \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{112}/Γ

<u>VALUE (units 10^{-4})</u>	<u>EVTS</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
0.36±0.25±0.05	10	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$

 $\Gamma(\gamma\eta(1475) \rightarrow K\bar{K}\pi)/\Gamma_{\text{total}}$ Γ_{114}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<1.4	90	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma K^+ K^- \pi^0$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<1.5	90	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma K_S^0 K^+ \pi^- + \text{c.c.}$
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 $\Gamma(\gamma\eta(1475) \rightarrow \eta\pi^+\pi^-)/\Gamma_{\text{total}}$ Γ_{115}/Γ

<u>VALUE (units 10^{-4})</u>	<u>CL%</u>	<u>DOCUMENT ID</u>	<u>TECN</u>	<u>COMMENT</u>
<0.88	90	ABLIKIM	06R BES2	$\psi(2S) \rightarrow \gamma\eta\pi^+\pi^-$

$\psi(2S)$ CROSS-PARTICLE BRANCHING RATIOS

For measurements involving $B(\psi(2S) \rightarrow \gamma \chi_{cJ}(1P)) \times B(\chi_{cJ}(1P) \rightarrow X)$
see the corresponding entries in the $\chi_{cJ}(1P)$ sections.

$\psi(2S)$ REFERENCES

ABLIKIM ANASHIN	07C 07	PL B648 149 JETPL 85 347	M. Ablikim <i>et al.</i> V.V. Anashin <i>et al.</i>	(BES Collab.) (KEDR Collab.)
		Translated from ZETFP 85 429.		
PEDLAR	07	PR D75 011102R	T.K. Pedlar <i>et al.</i>	(CLEO Collab.)
ABLIKIM	06G	PR D73 052004	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06I	PR D74 012004	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06L	PRL 97 121801	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06R	PR D74 072001	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	06W	PR D74 112003	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM	06	PRL 96 082004	N.E. Adam <i>et al.</i>	(CLEO Collab.)
AUBERT	06B	PR D73 012005	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT	06D	PR D73 052003	B. Aubert <i>et al.</i>	(BABAR Collab.)
AUBERT,BE	06D	PR D74 091103R	B. Aubert <i>et al.</i>	(BABAR Collab.)
DOBBS	06A	PR D74 011105R	S. Dobbs <i>et al.</i>	(CLEO Collab.)
ABLIKIM	05E	PR D71 072006	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05H	PR D72 012002	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05I	PL B614 37	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05J	PL B619 247	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05O	PL B630 21	M. Ablikim <i>et al.</i>	(BES Collab.)
ADAM	05	PRL 94 012005	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ADAM	05A	PRL 94 232002	N.E. Adam <i>et al.</i>	(CLEO Collab.)
ANDREOTTI	05	PR D71 032006	M. Andreotti <i>et al.</i>	(FNAL E835 Collab.)
AUBERT	05D	PR D71 052001	B. Aubert <i>et al.</i>	(BABAR Collab.)
BRIERE	05	PRL 95 062001	R.A. Briere <i>et al.</i>	(CLEO Collab.)
PEDLAR	05	PR D72 051108R	T.K. Pedlar <i>et al.</i>	(CLEO Collab.)
ABLIKIM	04B	PR D70 012003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04K	PR D70 112003	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04L	PR D70 112007	M. Ablikim <i>et al.</i>	(BES Collab.)
ATHAR	04	PR D70 112002	S.B. Athar <i>et al.</i>	(CLEO Collab.)
BAI	04B	PRL 92 052001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04C	PR D69 072001	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04D	PL B589 7	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04G	PR D70 012004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	04I	PR D70 012006	J.Z. Bai <i>et al.</i>	(BES Collab.)
PDG	04	PL B592 1	S. Eidelman <i>et al.</i>	
SETH	04	PR D69 097503	K.K. Seth	
AULCHENKO	03	PL B573 63	V.M. Aulchenko <i>et al.</i>	(KEDR Collab.)
BAI	03B	PR D67 052002	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	03C	PR D67 032004	J.Z. Bai <i>et al.</i>	(BES Collab.)
AUBERT	02B	PR D65 031101R	B. Aubert <i>et al.</i>	(BaBar Collab.)
BAI	02	PR D65 052004	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	02B	PL B550 24	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	02C	PRL 88 101802	J.Z. Bai <i>et al.</i>	(BES Collab.)
PDG	02	PR D66 010001	K. Hagiwara <i>et al.</i>	
BAI	01	PR D63 032002	J.Z. Bai <i>et al.</i>	(BES Collab.)
AMBROGIANI	00A	PR D62 032004	M. Ambrogiani <i>et al.</i>	(FNAL E835 Collab.)
ARTAMONOV	00	PL B474 427	A.S. Artamonov <i>et al.</i>	
BAI	00	PRL 84 594	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	99C	PRL 83 1918	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98E	PR D57 3854	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98F	PR D58 097101	J.Z. Bai <i>et al.</i>	(BES Collab.)
BAI	98J	PRL 81 5080	J.Z. Bai <i>et al.</i>	(BES Collab.)
ARMSTRONG	97	PR D55 1153	T.A. Armstrong <i>et al.</i>	(E760 Collab.)
GRIBUSHIN	96	PR D53 4723	A. Gribushin <i>et al.</i>	(E672 Collab., E706 Collab.)
ARMSTRONG	93B	PR D47 772	T.A. Armstrong <i>et al.</i>	(FNAL E760 Collab.)
ALEXANDER	89	NP B320 45	J.P. Alexander <i>et al.</i>	(LBL, MICH, SLAC)
COHEN	87	RMP 59 1121	E.R. Cohen, B.N. Taylor	(RISC, NBS)
GAISER	86	PR D34 711	J. Gaiser <i>et al.</i>	(Crystal Ball Collab.)
KURAEV	85	SJNP 41 466	E.A. Kuraev, V.S. Fadin	(NOVO)
		Translated from YAF 41 733.		

FRANKLIN	83	PRL 51 963	M.E.B. Franklin <i>et al.</i>	(LBL, SLAC)
EDWARDS	82C	PRL 48 70	C. Edwards <i>et al.</i>	(CIT, HARV, PRIN+)
LEMOIGNE	82	PL 113B 509	Y. Lemoigne <i>et al.</i>	(SACL, LOIC, SHMP+)
HIMEL	80	PRL 44 920	T. Himel <i>et al.</i>	(LBL, SLAC)
O'REGLIA	80	PRL 45 959	M.J. Oreglia <i>et al.</i>	(SLAC, CIT, HARV+)
SCHARRE	80	PL 97B 329	D.L. Scharre <i>et al.</i>	(SLAC, LBL)
ZHOLENTZ	80	PL 96B 214	A.A. Zholents <i>et al.</i>	(NOVO)
Also		SJNP 34 814	A.A. Zholents <i>et al.</i>	(NOVO)
		Translated from YAF 34 1471.		
BRANDELIK	79B	NP B160 426	R. Brandelik <i>et al.</i>	(DASP Collab.)
BRANDELIK	79C	ZPHY C1 233	R. Brandelik <i>et al.</i>	(DASP Collab.)
BARTEL	78B	PL 79B 492	W. Bartel <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	78	PR D17 1731	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL)
BIDDICK	77	PRL 38 1324	C.J. Biddick <i>et al.</i>	(UCSD, UMD, PAVI+)
BRAUNSCH...	77	PL 67B 249	W. Braunschweig <i>et al.</i>	(DASP Collab.)
BURMESTER	77	PL 66B 395	J. Burmester <i>et al.</i>	(DESY, HAMB, SIEG+)
FELDMAN	77	PRPL 33C 285	G.J. Feldman, M.L. Perl	(LBL, SLAC)
YAMADA	77	Hamburg Conf. 69	S. Yamada	(DASP Collab.)
BARTEL	76	PL 64B 483	W. Bartel <i>et al.</i>	(DESY, HEIDP)
TANENBAUM	76	PRL 36 402	W.M. Tanenbaum <i>et al.</i>	(SLAC, LBL) IG
WHITAKER	76	PRL 37 1596	J.S. Whitaker <i>et al.</i>	(SLAC, LBL)
ABRAMS	75	Stanford Symp. 25	G.S. Abrams	(LBL)
ABRAMS	75B	PRL 34 1181	G.S. Abrams <i>et al.</i>	(LBL, SLAC)
BOYARSKI	75C	Palermo Conf. 54	A.M. Boyarski <i>et al.</i>	(SLAC, LBL)
HILGER	75	PRL 35 625	E. Hilger <i>et al.</i>	(STAN, PENN)
LIBERMAN	75	Stanford Symp. 55	A.D. Liberman	(STAN)
LUTH	75	PRL 35 1124	V. Luth <i>et al.</i>	(SLAC, LBL) JPC
WIJK	75	Stanford Symp. 69	B.H. Wiik	(DESY)

OTHER RELATED PAPERS

AUBERT,BE	06F	PR D74 111103R	B. Aubert <i>et al.</i>	(BABAR Collab.)
AMBROGIANI	05	PL B610 177	M. Ambrogiani <i>et al.</i>	(FNAL E853 Collab.)
GUO	05	NP A761 269	F.-K. Guo <i>et al.</i>	
VOLOSHIN	05	PR D71 114003	M.B. Voloshin	
ABLIKIM	04I	PR D70 092004	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	04J	PRL 93 112002	M. Ablikim <i>et al.</i>	(BES Collab.)
LIU	04B	PR D70 094001	K.-Y. Liu, K.-T. Chao	
WANG	04C	PR D70 077505	P. Wang, X.H. Mo, C.Z. Yuan	
BAI	00E	PR D62 032002	J. Bai <i>et al.</i>	(BES Collab.)
CHEN	98	PRL 80 5060	Y.Q. Chen, E. Braaten	
SUZUKI	98	PR D57 5717	M. Suzuki	
BARATE	83	PL 121B 449	R. Barate <i>et al.</i>	(SACL, LOIC, SHMP, IND)
AUBERT	75B	PRL 33 1624	J.J. Aubert <i>et al.</i>	(MIT, BNL)
BRAUNSCH...	75B	PL 57B 407	W. Braunschweig <i>et al.</i>	(DASP Collab.)
CAMERINI	75	PRL 35 483	U. Camerini <i>et al.</i>	(WISC, SLAC)
FELDMAN	75B	PRL 35 821	G.J. Feldman <i>et al.</i>	(LBL, SLAC)
GRECO	75	PL 56B 367	M. Greco, G. Pancheri-Srivastava, Y. Srivastava	
JACKSON	75	NIM 128 13	J.D. Jackson, D.L. Scharre	(LBL)
SIMPSON	75	PRL 35 699	J.W. Simpson <i>et al.</i>	(STAN, PENN)
ABRAMS	74	PRL 33 1453	G.S. Abrams <i>et al.</i>	(LBL, SLAC)